DRAFT

Smoky Canyon Mine
Quality Assurance Project Plan For
Environmental Monitoring Activities

Revision No. 1

August 2015

Prepared for:

J.R. Simplot Company
Smoky Canyon Mine
1890 Smoky Canyon Mine Road
Afton, WY 83110

P.O. Box 27, One Capital Center
999 Main Street, Suite 1300
Boise, ID 83707-0027

Prepared by:

Formation Environmental, LLC
2500 55th Street, Suite 200
Boulder, Colorado 80301

J.R. Simplot Company
SMOKY CANYON MINE

QUALITY ASSURANCE PROJECT PLAN FOR ENVIRONMENTAL MONITORING ACTIVITIES

Name — Date
BLM Representative

Name — Date
USFS Representative

Chad Gentry — Date
J.R. Simplot Company Smoky Canyon Mine Manager

Rachel Roskelley — Date
J.R. Simplot Company Smoky Canyon Mine Environmental Manager

Name — Date
J.R. Simplot Company Quality Assurance Officer

Plan is effective on date of last signature above.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

LIST OF ACRONYMS

BLM	Bureau of Land Management
CEMPP	Comprehensive Environmental Monitoring Program Plan
COC/RA	Chain of Custody/Request for Analysis
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CVAA	Cold Vapor Atomic Absorption
DI	Deionized
DQOs	Data Quality Objectives
EIS	Environmental Impact Statement
EDD	Electronic Data Deliverable
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICPMS	Inductively Coupled Plasma-Mass Spectrometry
ICV	Initial Calibration Verification
IDEQ	Idaho Department of Environmental Quality
LCS	Laboratory Control Sample
MDL	Method Detection Limit
mg/kg	milligrams per kilograms
mg/L	milligrams per liter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PARCC	precision, accuracy, representativeness, comparability and completeness
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
ROD	Record of Decision
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SOP	Standard Operating Procedures
SRM	Standard Reference Material

TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
USEPA CLP	USEPA Contract Laboratory Program
USEPA NFG	USEPA National Functional Guidelines
USFS	US Forest Service

1.0 INTRODUCTION

The purpose of this Quality Assurance Project Plan (QAPP) is to describe the quality assurance and quality control (QA/QC) policies and procedures used for data collection and evaluation activities conducted to address environmental monitoring requirements associated with operations at the J.R. Simplot Company (Simplot) Smoky Canyon Mine (the Site). This QAPP is to be used in conjunction with the Comprehensive Environmental Monitoring Program Plan (CEMPP), Draft Revision No. 4 (Formation, 2015), which comprehensively addresses all existing environmental monitoring requirements associated with mining and reclamation activities at the Smoky Canyon Mine. This QAPP presents appropriate QA/QC protocols for all of the ongoing data collection programs at the Smoky Canyon Mine, including those implemented in accordance with existing Administrative Orders and Administrative Settlement Agreements/Orders on Consent for environmental investigation and monitoring in accordance with CERCLA requirements (refer to Section 2.2 below). The policies and procedures described in this QAPP supersede those presented in the 2009 Draft QAPP (Rev. 0).

This QAPP was prepared in accordance with USEPA Guidance for Quality Assurance Project Plans (USEPA, 2002; EPA QA/G-5) and the USEPA Requirements for Quality Assurance Project Plans (USEPA, 2001; EPA QA/R-5), and is comprised of four basic project plan elements:

- project management;
- data generation and data acquisition;
- assessment and oversight; and
- data validation and usability.

The four subsections that follow provide the four USEPA project plan elements (USEPA, 2001 and 2002), and each presents the topics applicable to that element with appropriate Site-specific content, as needed for addressing the Smoky Canyon environmental monitoring requirements.

2.0 PROJECT MANAGEMENT

This section addresses project administrative functions and project concerns, goals, and approaches to be followed during implementation of the required environmental monitoring for all areas at the Smoky Canyon Mine that are defined in the CEMPP (Formation, 2015).

2.1 Project Organization

Simplot implements diverse environmental monitoring activities required through various regulatory programs (refer to Section 1 of CEMPP). The following individuals are involved in implementation of the environmental monitoring tasks required by the CEMPP; job descriptions and responsibilities are outlined below. An organizational chart showing the project management structure is provided as Figure 2-1. Simplot may contract with consultants and contractors as needed to complete the environmental monitoring.

Simplot Smoky Canyon Mine - Mine Manager

The Mine Manager oversees scheduling and management of all on-Site aspects of the project and provides necessary resources for conduct of on-Site data collection, testing, or construction activities related to Smoky Canyon environmental monitoring.

Simplot Smoky Canyon Mine - Environmental Manager

The Mine Environmental Manager oversees scheduling and management of all technical and non-technical aspects of the project (e.g., field activities, data collection, data analysis, report preparation, scheduling, costing). Plans and supervises sampling and other field activities, including management of subcontractors participating in that work. Schedules and manages various field tasks (e.g. sample collection, measurements, data collection). Ensures that Simplot field staff and/or subcontractors understand the scope of work, including QA/QC requirements, and have appropriate training to implement standard operating procedures (SOPs) included as Appendix A of the CEMPP (Formation, 2015). Makes certain that the environmental monitoring plans and QAPP are implemented by Simplot or contractor personnel performing the data collection activities. Maintains the mine's water quality monitoring records and provides data reports in accordance with the environmental monitoring plans and permit requirements.

Consultant Project Manager(s)

The Consultant Project Manager oversees scheduling and management of all technical and non-technical aspects of the project (e.g., field activities, data collection, data analysis, report preparation, scheduling, costing). Reports to the Simplot Environmental Manager. Ensures that all field personnel understand the scope of work, including QA/QC requirements specified by QAPP.

Plans and supervises sampling and other field activities in conjunction with the Simplot Mine Environmental Manager, and obtains necessary permits. Schedules and manages various field tasks (e.g., sample collection, measurements, data collection) and is responsible for ensuring that field staff have appropriate, hands-on training.

Consultant(s) Quality Assurance (QA) Manager

The Consultant QA Manager is responsible for coordinating the development and approval of this QAPP and its supporting procedures and for maintaining the current, approved version of the QAPP for use on the project. The QA Manager participates in the review and approval of all project deliverables, assists with establishing laboratory contracts, acts as a day-to-day liaison with the laboratories, directs field and laboratory audit activities, coordinates any subsequent corrective and preventive actions, if needed, and communicates regularly with the Simplot Environmental Manager and Consultant Project Manager regarding any laboratory or data validation concerns. The QA Manager will also oversee data validation efforts and coordinate the resolution of any necessary corrective actions resulting from data validation activities, including any quality issues that may be resolved during field activities (i.e., resampling to replace unusable samples).

Laboratory Representative(s)

The Laboratory Representative reviews QAPP and ensures laboratory resources are available, reviews final analytical reports produced by the laboratory, coordinates scheduling of laboratory analyses, and supervises in-house chain-of-custody procedures.

Field Supervisors and Sampling Personnel

The Field Supervisor(s) and field sampling personnel performing sampling and data collection may be either Simplot employees or subcontracted workers. All field staff must have hands-on training in the use of the SOPs included in Appendix A of the CEMPP, or other appropriate experience. The Mine's Environmental Manager is responsible for ensuring that Simplot field staff have appropriate, hands-on training.

2.2 Problem Definition/Background

The Smoky Canyon Mine environmental monitoring program provides the data needed to track and document environmental conditions within and around the active mining operations and demonstrate that the mining activities are in compliance with Federal and state regulations and various mine-operations permits. The mine's monitoring requirements have been established at various points in time and through a number of different regulatory programs (e.g., National

Environmental Policy Act, Clean Water Act) and interagency agreements since approval of the original Surface Mine and Reclamation Plan in 1983.

Currently, Simplot is implementing environmental monitoring programs required by the Environmental Impact Statement (EIS) for the Smoky Canyon Mine (USFS and BLM, 1982); the original Surface Mine and Reclamation Plan (Mine Plan) (Simplot, 1981), including US Forest Service (USFS) and Bureau of Land Management (BLM) approved modifications of the Mine Plan in 1991, 1992, and 1997; the Supplemental Environmental Impact Statement for Panels B and C (BLM and USFS, 2002a) and the Panels B and C Record of Decision (ROD) (BLM and USFS, 2002b). In addition, monitoring at Panels F and G is conducted as required by the Panels F and G FEIS (USFS and BLM, 2007) and RODs issued by the USFS (2008) and BLM (2008). Simplot also performs monitoring in accordance with various permits issued by different regulatory agencies for certain aspects of mine operations.

Most recently, Simplot has been performing additional environmental sampling activities to evaluate the effects of historical mining operations on environmental conditions and to identify any related risks to human or ecological receptors. These investigations are performed using planning documents prepared in accordance with several different Administrative Settlement Agreements or Administrative Orders on Consent/Consent Orders entered into by Simplot and different federal and state land management and regulatory agencies, which currently include the following:

- 2003 Administrative Order on Consent requiring a Site Investigation/Engineering Evaluation Cost Analysis for historical mining areas on Federal leases and investigation and characterizing environmental effects from two tailings impoundments located on private land.

- 2006 Administrative Settlement Agreement and Order on Consent/Consent Order for Non-Time Critical Removal Action – Pole Canyon Creek Diversion.

- 2009 Administrative Settlement Agreement/Consent Order requiring a Remedial Investigation and Feasibility Study for historical mining areas.

- 2013 Administrative Settlement Agreement and Order on Consent/Consent Order for Non-Time Critical Removal Action – Pole Canyon Overburden Disposal Area Cover System.

Various federal and state regulatory agencies are parties to these agreements and have oversight of work performed by Simplot to address the orders' requirements. The various orders have their own specifications for data collection, review and reporting, which must be met by Simplot through implementation of agency-approved planning documents.

This QAPP is intended to provide a single set of standard QA/QC requirements to address the various requirements of the orders listed above, as well as the mine's routine environmental monitoring activities, which are specified separately by BLM, USFS, IDEQ and other agencies with oversight authority for ongoing mine operations.

2.3 Project/Task Description

The purpose of this QAPP is to provide a consistent set of QA/QC protocols associated with the mine's routine environmental monitoring activities. As a companion document to the CEMPP, this QAPP is intended to serve as a single point of reference for implementation of QA/QC measures in association with environmental monitoring. To the extent possible, this QAPP provides one set of QA/QC requirements that can be applied to the diverse scope of monitoring activities implemented by Simplot at the Smoky Canyon Mine. Deviations from this plan should be developed and initiated with prior concurrence from appropriate regulatory-oversight agencies and also fully documented, in advance, through addendums or attachments to this QAPP.

In general, environmental monitoring data are being collected to track conditions at the mine over time, demonstrate compliance with regulatory standards, identify conditions that may warrant response actions to maintain compliance with regulatory standards and mine-operations permits, and to assist in the final overburden disposal and reclamation planning and implementation. Water quality data will be used to track conditions over time and to demonstrate compliance with applicable water quality regulations and standards.

As detailed in the CEMPP, updated in 2015, various types of environmental monitoring are required elements of the Smoky Canyon Mine operations. The CEMPP monitoring activities are described in the following individual plans, which collectively address all of the environmental monitoring requirements associated with ongoing, agency-approved mining operations at the Smoky Canyon Mine:

- Surface Water and Groundwater Monitoring (Section 2 of CEMPP); including the routine collection of surface water samples, including seeps and surface runoff samples, measurement of stream discharge (flow) in creeks and springs, routine collection of groundwater samples, and measurement of water levels in groundwater monitoring wells;
- Storm Water Monitoring (Section 3 of CEMPP), including storm water monitoring and sampling;
- Best Management Practices Effectiveness Monitoring (Section 4 of CEMPP), including the collection of surface runoff, seepage, and soil samples;
- Wetlands Mitigation and Monitoring Plan (Section 5 of CEMPP);
- Wildlife and Aquatic Resources Monitoring Plan (Section 6 of CEMPP), including fish sampling and tissue analysis;

- Cultural and Paleontological Resources Monitoring Plan (Section 7 of CEMPP);
- Soil Inventory and Salvage Plan (Section 8 of CEMPP), including the collection of salvaged and stockpiled soil samples;
- Reclamation Vegetation Monitoring Plan (Section 9 of CEMPP), including the collection of vegetation and soil samples;
- Overburden Areas Study Plans (Section 10 of CEMPP);
- Panels F and G Aquatic Resources and Fisheries Monitoring Plan (Section 11 of CEMPP), including the collection of surface water, sediment, and biotic tissue samples; and
- Panels F and G Store and Release Cover System Monitoring Plan (Section 12 of CEMPP).

The specific objectives for each of these data collection activities and the intended data uses are described in the individual monitoring plans referenced above. The individual monitoring plans also provide the parameters that will be measured in the field and analyzed for each sample collected for laboratory analysis. The laboratory analytical methods to be used for analysis are discussed in Section 3.4 of this QAPP.

Some of the data collection activities associated with the CEMPP are more qualitative in nature – visual inspections and qualitative evaluation of storm water controls and best management practices, wildlife surveys and incident reports, paleontological- and cultural-resource observation and reporting – and they are not covered by this QAPP. Other data collection activities involve standardized field tests to evaluate geotechnical properties of cover materials or bedrock in overburden storage and disposal areas. These are engineering support activities that will be performed by licensed Professional Engineers, and they are not covered by this QAPP. Specific QA/QC protocols associated with the engineering support activities are included in related planning documents, or they will be developed in accordance with those plans.

Environmental monitoring data collected under the CEMPP is routinely compiled and reported to the appropriate regulatory agencies having oversight responsibilities for different elements of the mine's operations.

2.4 Quality Objectives and Criteria

The objectives of this QAPP are to assure that the precision and accuracy of program data are known and documented; that sample collection, analysis, and reporting are complete; and that samples are representative of tested environmental media. An additional objective is to provide QA/QC procedures and criteria that allow Simplot to use the mine's environmental data to address the numerous and diverse monitoring requirements identified above in Section 2.2.

Measurement performance criteria are established herein for each field and laboratory measurement parameter. Measurement performance criteria are established by defining acceptance criteria and quantitative or qualitative goals (e.g., control limits) for precision, accuracy, representativeness, comparability, and completeness (PARCC parameters). The definitions of the PARCC parameters are provided below in Section 2.4.2, along with the acceptance criteria for data collected in support of the environmental monitoring at Smoky Canyon Mine.

2.4.1 Data Quality Objectives

Consistent with USEPA guidelines (USEPA, 2006), the data quality objectives (DQOs) describe the systematic planning of data collection activities to assure that the proper type, quality, and quantity of data are collected. The DQOs for Smoky Canyon Mine's environmental monitoring activities are described in the individual plans included in the CEMPP (Formation, 2015). Those plans indicate the source(s) of specific monitoring requirements and intended uses for data collected to address those requirements. The individual plans also present the sampling designs and procedures developed to provide the appropriate types of data for one or more intended uses.

Implementation of the following QA/QC activities during data collection (in the field and laboratory) will ensure that environmental monitoring data are of appropriate and acceptable quality for their intended uses:

- following specific sampling designs (refer to CEMPP);
- adherence to standardized procedures for field measurements, sampling, sample handling, and sample chain of custody (refer to Standard Operating Procedures [SOPs] in Appendix A of CEMPP);
- collection, analysis, and assessment of field and laboratory QC samples, as discussed in Sections 3.5.1 and 3.5.2;
- analyses of samples in accordance with standard method protocols selected to meet the project's measurement performance goals and detectability requirements;
- implementation of laboratory-specific preventative maintenance measures;
- data review and reduction by the laboratories;
- laboratory data quality assessment;
- data validation, when specified (refer to Attachment 1 [JRS SOP No. 20]); and
- quality auditing and corrective/preventative action processes.

2.4.2 Measurement Performance Criteria

The definitions of the PARCC parameters are provided below along with the acceptance criteria for data collected in support of the CEMPP. Equations for calculation of precision, accuracy, and completeness are also provided in Table 2-1.

Precision

Precision is the level of agreement among repeated measurements of the same characteristic. There are two general forms of uncertainty. The first is the random error component of the data collection process. The second is inherent stochastic variability, which cannot be eliminated but can be described.

Data precision is assessed by determining the agreement between replicate measurements of the same sample and/or measurements of duplicate samples. The overall random error component of precision is a function of the sampling and analytical precision and is assessed by the analysis of field duplicates. The analytical precision is determined by the analysis of field duplicates by laboratories and by replicate analyses of the same sample. An analytical duplicate is the preferred measure of analytical method precision. Precision may also be evaluated using duplicate analyses of laboratory prepared samples such as duplicate laboratory control samples (LCS/LSCD) and duplicate laboratory matrix spike samples (MS/MSD).

Precision can be measured as relative percent difference (RPD) or as relative standard deviation (RSD; also known as a coefficient of variation). Formulae for both are presented in Table 2-1.

For this project, precision shall be determined on field data and laboratory analysis data by the analysis of field duplicates, analytical duplicates, and/or matrix spike/matrix spike duplicate results and evaluation of the RPD for these various paired measurements. The project's goals for measures of precision associated with the analysis methods are presented in Table 2-2 (EPA 6020A), Table 2-3 (EPA 6010C), Table 2-4 (EPA 7470A), Table 2-5 (EPA 7742), and Table 2-6 (EPA 9310).

Accuracy

Accuracy is the degree of difference between the measured or calculated value and the true value. It is a measure of the bias or systematic error of the entire data collection process. Potential sources of systematic errors include:

- sample collection methods;
- physical or chemical instability of the samples;
- interference effects during sample analysis;
- calibration of the measurement system; and
- contamination.

Data accuracy or analytical bias may be evaluated by the analysis of laboratory control samples (LCS) and/or matrix spike (MS) samples, with results expressed as a percentage recovery

measured relative to the true (known) concentration (refer to Table 2-1 for percent recovery calculations).

Field equipment blanks and laboratory blanks may be analyzed to assess artifacts introduced during sampling, transport, and/or analysis that may affect the accuracy of the data. In addition, initial and continuing calibration verification samples (ICV and CCVs) and initial and continuing calibration blanks (ICB and CCB) may be used to verify that the sample concentrations are accurately measured by the analytical instrument throughout the analytical run.

For this project, sampling accuracy may be determined by the collection and analysis of deionized (DI) water and equipment blanks, at the frequencies described in Section 3.5.1. Laboratory accuracy is determined by the analysis of calibration and method blanks, calibration verification samples, laboratory control samples or standard reference materials, and matrix spike samples. Accuracy goals for the specific laboratory analysis methods that will be relied on to generate data for the Smoky Canyon Mine environmental samples are summarized in Table 2-2 (EPA 6020A), Table 2-3 (EPA 6010C), Table 2-4 (EPA 7470A), Table 2-5 (EPA 7742), and Table 2-6 (EPA 9310).

Representativeness

Data representativeness is defined as the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program. Representativeness of samples shall be achieved through the careful selection of sampling locations and methods. The sampling programs described in the CEMPP (Formation, 2015) have been designed to provide samples that are representative of the medium being sampled as well as a sufficient number of samples to meet the project DQOs. Sample representativeness is also evaluated using the RPDs for field duplicate results and by a review of the results of field blanks (i.e., equipment blanks, as appropriate to sampling methods).

Representativeness of individual sample analyses will be described on the basis of results obtained from associated laboratory quality control samples. The representativeness of sample analyses will be considered acceptable as long as any detectable concentrations of analytes in associated field and method blanks are less than the quantitation limit (QL), or the associated sample results are qualified appropriately (refer to Section 5.2).

Comparability

Data comparability is defined as the measure of the confidence with which one data set can be compared to another. Comparability is a qualitative parameter but must be considered in the design of the sampling plan and selection of analytical methods, quality control protocols, and data reporting requirements. Comparability shall be ensured by analyzing samples obtained in

accordance with appropriate SOPs and the referenced standard laboratory analysis methods. All data should be calculated and reported in units consistent with standard reporting procedures so that the results of the analyses can be compared with those of other laboratories, if necessary. In general, data shall be reported in mg/L for water matrices and mg/kg (with the moisture basis specified) for solid matrices.

Completeness

Completeness refers to the amount of usable data produced during a sampling and analysis program. The procedures established in this QAPP are designed to ensure, to the extent possible, that data shall be valid and usable. To achieve this objective, every effort shall be made to collect each required sample and to avoid sample loss. The project's completeness goals are 95 percent for groundwater, surface water, sediment and soil analyses and 90 percent for tissue analyses.

2.5 Training Requirements

Field personnel shall be trained in the requirements of the individual plans included in the CEMPP (Formation, 2015) prior to conducting field activities and as appropriate to the types of monitoring activities to be performed. All personnel shall read the appropriate CEMPP documents, including this QAPP, prior to the start of field work and shall acknowledge that they have read the documents. In addition, prior to conducting sampling activities, the Field Supervisor, or designee, shall review field procedures and sampling requirements in order to better ensure that samples are collected and handled according to CEMPP and QAPP requirements. One copy of the current approved version of the entire CEMPP and this QAPP shall be maintained for ready-reference purposes in the field (field vehicle or field office at mine). All field team members shall have electronic access to *.pdf format files of the complete CEMPP and this QAPP. Laboratory personnel shall be trained according to the specifications in the laboratory QA manual and SOPs.

2.6 Documents and Records

This section describes the management of project documents and records, including this QAPP.

2.6.1 Field Notebooks

Documentation of observations in the field provides information on conditions at the time of sampling and a permanent record of field activities. Field observations and data collected during environmental monitoring activities will be recorded with waterproof ink in a permanently bound, weatherproof, notebook or on field forms associated with the individual SOPs referenced by the CEMPP (refer to Appendix A). Field forms for recording various types of sampling and measurement activities include sampling of surface water, groundwater, fish tissue, sediment, soil, and vegetation and collection of groundwater depth-to-water and surface water discharge

measurements. Field documentation procedures and required entries are further detailed in JRS SOP No. 1, Field Documentation, included in Appendix A of the CEMPP (Formation, 2015).

Completed field forms and notebooks will be copied to the project's quality records (refer to Section 2.6.4), in addition to copies of outgoing chain-of custody (COC)/request for analysis (RA) forms and sample shipment records.

2.6.2 COC Records

Documentation of sample custody must be maintained. Information on the custody, transfer, handling, and shipping of samples shall be recorded by field personnel on a COC/RA form as specified in JRS SOP No. 2 (Appendix A of CEMPP), and as described in greater detail in Section 3.3.3 of this QAPP. A copy of each COC/RA form shall be retained in the program quality records (refer to Section 2.6.4 of this QAPP).

2.6.3 Analytical Laboratory Records

Results received from the laboratory will be documented both in report form and in an electronic format. Original hard copy deliverables and electronic files received from laboratories will be maintained with the program quality records, as described below in Section 2.6.4. Section 5.1.3 presents the project's laboratory reporting requirements in detail. The hard-copy deliverable (data "package" or "report") issued to Simplot will include data necessary to complete validation of laboratory results in accordance with specifications included in Section 5.2.

2.6.4 Program Quality Records

Program quality records are defined as completed, legible documents that furnish objective evidence of the quality of items or services, activities affecting quality, or the completeness and quality of data.

These records shall be organized and managed by Simplot or their consultants and shall include, at a minimum:

- copies of all bound field notebooks;
- copies of all field documentation forms;
- field copies and original (laboratory) copies of all COC/RA forms;
- incoming and outgoing program correspondence (letters, telephone conversation records, faxes, and e-mail messages);
- copies of all laboratory agreements and amendments thereto;
- as-received laboratory data report (hard copy and/or electronic) and any associated laboratory data validation records;
- documentation of field and/or laboratory audit findings and any resulting corrective actions.

The other documentation included in the program's quality records include the CEMPP and QAPP, any approved revisions or addendums to the CEMPP and QAPP, and SOPs referred to for field data collection with any updates, revisions, or addendums to those SOPs approved by the Consultant Project Manager to address specific conditions encountered at the Site during field investigations.

3.0 DATA GENERATION AND ACQUISITION

The elements in this section address management of data generation and acquisition activities.

3.1 Sampling Process Design

Detailed descriptions of the sampling design for environmental monitoring at the Site, including the sampling locations and frequencies, are contained in the individual plans included in the CEMPP (Formation, 2015).

3.2 Sampling Methods

The CEMPP describes in detail the procedures that will be used to collect each sample type planned for the environmental monitoring. The SOPs included in Appendix A of the CEMPP are more detailed descriptions of those procedures, and they also provide information on field documentation and QA activities for the sampling team.

3.3 Sample Handling and Custody

This section describes sample handling requirements and chain of custody procedures from the sample collection step through laboratory analysis and ultimate disposal.

3.3.1 Sample Labeling

Each sample that is collected in the field will be labeled for future identification. Sample labels may be filled out as completely as possible by a member of the sampling team prior to the start of the day's field sampling activities. Samples will be labeled with all necessary information on pre-printed waterproof labels using waterproof ink. At a minimum, each sample label shall contain the following information:

- Project identification;
- Lab name;
- Sample identification number (including codes for site location, sample media, and sample type, described in further detail below);
- Date and time of sample collection;
- Sample media;
- Requested analyses and method;
- Bottle type;
- Method of preservation, if used;
- Lab QC, if applicable; and
- Initials of sample collector(s).

Each sample shall be assigned a unique sample identification number. These numbers are required for tracking the handling, analysis, and verification or validation status of all samples collected during monitoring. Each sample identification number will identify the sampling location and type of sample. Sample identification numbers will be assigned using several codes as follows:

Sampling Event - Location - Media and Sample Type and Number

SC0515-LSV2C-FT013

The first field in the identification number identifies the general sampling location and time period. For example, samples collected in May 2015 will all have the prefix “SC0515.”

The second field in the identification number identifies the location of the sample. For example, LSV-2C is a designated sampling location in the Lower Sage Valley. Location identifiers for most locations have already been established and are included on the CEMPP sample location maps. The location identifiers established by the CEMPP will be used whenever they are available.

The third field has three parts. The first part is a two- or three-letter acronym that identifies the sample media type. The media types are defined as:

GW: groundwater

SW: surface water

SD: sediment

SL: soil (or overburden)

VG: terrestrial vegetation tissue

FT: fish tissue

ITT: terrestrial macroinvertebrate/insect tissue

ITA: aquatic benthic macroinvertebrate tissue

MT: small mammal tissue

The second part of the third field is comprised of a single digit describing the intended sample use. These sample use codes and include:

0: primary sample

2: field duplicate sample

3: equipment rinsate or QA/QC blank sample

Note that additional codes may be added as the project proceeds. The additions will be communicated immediately to the field staff and data management team.

The third and final part of the third field is a two-digit number unique to the specific sample. Numbers will begin with 01 and increase consecutively as sampling tasks are implemented.

For example, SC0514-LSV2C-FT013, is a primary fish tissue sample collected from location LSV-2C in the Lower Sage Valley in May 2014 with the sequential number 13 (i.e., the thirteenth fish sample collected at that site).

Samples will be immediately labeled in the field and sample numbers shall be recorded at the time of sampling in field notes and on field data collection forms.

3.3.2 Sample Containers, Preservation, and Holding Times

Sample Containers

For aqueous sample matrices (i.e., groundwater, surface water, rinsates, etc.), the laboratory will provide new, certified pre-cleaned, prepared sample containers appropriate to the list of analyses to be requested and as specified in Table 2-7. For the other media, samples may be collected in containers supplied by the sampling contractor, in accordance with each sampling task in the CEMPP and appropriate sample collection SOP (Appendix A of CEMPP).

Sample Preservation and Storage

Samples are preserved in order to prevent or minimize chemical changes that could occur during transit and storage. Sample containers including appropriate preservative are used to ensure preservation immediately upon sample collection. The contracted laboratories will provide containers and appropriate preservatives (i.e., “pre-preserved” containers), as needed for the analyses to be requested.

Aqueous samples (groundwater, surface water, equipment rinsates) submitted for metals/metalloids analyses, as well as some other analyses, require preservation upon collection, as specified in Table 2-7. Preservation requirements are associated with the individual analyses to be performed and the referenced analytical methods.

Solid samples (sediment, soil, overburden) typically do not require preservation other than temperature control during storage and transfer to the laboratory. Tissue samples may also be frozen for storage and shipping.

Sample Holding Times and Analyses

Sample holding times are established to minimize chemical changes in a sample prior to analysis and/or extraction. A holding time is defined as the allowable time between sample collection and analysis recommended to ensure accuracy and representativeness of analysis results, based on the nature of the analyte of interest and chemical stability factors.

Immediately after collection, samples shall be placed in field coolers with wet ice and/or blue ice. If there is no likelihood that a holding time will be violated, samples may be transferred to a locked refrigerator or something comparable for one or more days of storage prior to shipping to a laboratory. Transfer to the laboratory for analysis should be prompt to minimize the possibility of exceeding holding times. Prompt delivery of biological tissue samples to the laboratory is critical in order to minimize risk of decomposition.

Holding times for the chemical constituents for which samples will be analyzed are summarized in Table 2-7. Failure to conduct analyses within the required holding times may potentially require the qualification of associated analytical results and shall prompt appropriate corrective and preventive action measures as outlined in Section 4.3.

3.3.3 Sample Handling and Chain of Custody

Sample Handling and Shipping

After collection, sample labels will be completed (refer to Section 3.3.1 above), and the samples will be placed on ice in an insulated cooler. The sample containers will be placed in re-closeable freezer-type plastic storage bags. Each sample container will be carefully packaged in a shipping container, typically an ice chest, with packing material to prevent breakage during shipment. A labeled temperature blank may also be included with each cooler shipped, if temperature-sensitive samples were collected. Ice placed in the cooler will be double-bagged to prevent leakage of water. The coolers will be taped shut.

Sample Custody

After samples have been collected, they will be maintained under chain-of-custody protocols. The field sampling personnel will complete a COC/RA form (refer to JRS SOP No. 2, Appendix A of CEMPP) for each separate shipping container (i.e., cooler, ice chest or other container) of samples to be delivered to the laboratory for analysis. The sampler is responsible for initiating and filling out the COC/RA form. The COC/RA for a shipping container will list only those samples in that shipping container. The specific information that will be contained on the COC/RA form is provided in JRS SOP No. 2 (Appendix A of CEMPP). Any documentation, including COC/RAs, placed inside the cooler during sample shipment, should be placed inside a zip-lock bag.

The sampling personnel whose signature appears on the COC/RA form is responsible for the custody of the samples from the time of sample collection until custody of the samples is transferred to a designated laboratory, a courier, or to another project employee for the purpose of transporting the sample to the designated laboratory. Custody is transferred when both parties to the transfer complete the portion of the COC/RA under "Relinquished by" and "Received by." Signatures, printed names, company names, dates and times are required. Upon transfer of custody, the sampling personnel who relinquished the samples will retain a copy of the COC/RA form. When the samples are shipped by a courier or overnight delivery service, shipment records will be used to document the sample custody. Copies of all shipment records will be retained as part of the permanent documentation in the project file. It is not necessary for courier personnel to sign the COC/RA form.

When the analytical laboratory receives the samples, the COC/RA form will be immediately signed along with the date and time of receipt. A copy of the COC/RA form will be returned with the final analytical report. The laboratory will follow appropriate chain-of-custody procedures when shipping any samples to a subcontracted laboratory for analysis. A copy of all inter-laboratory COC/RA forms will be included with the final analytical report.

Laboratory Sample Handling and Storage

Upon receipt by the laboratory, the samples will be inspected for sample integrity and proper preservation, including temperature. The COC/RA form will be reviewed to verify completeness. Any discrepancies between the COC/RA form and sample labels and any problems or questions noted upon sample receipt will be communicated immediately to the QA Manager. The laboratory shall provide the QA Manager with a copy of the COC/RA form, and associated sample-receipt information, within 2 working days of receipt of samples. The sample-receipt information routinely provided will include: sample receipt date, sample identifiers transcribed from the COC/RA forms, sample media type, list of analyses to be performed for each sample, and verification of sample temperatures and preservation requirements. Broken custody seals, damaged sample containers, sample labeling discrepancies between container labels and the COC/RA form, and analytical request discrepancies shall be noted on the COC/RA form. The QA Manager shall be notified of any such problems; discrepancies or non-conformances shall be resolved and addressed prior to the samples being released to the laboratory for analysis.

The laboratory will store the samples in a specially designated area, which is clean and maintained at the appropriate preservation temperature, if necessary. The laboratory will be responsible for following their internal custody procedures from the time of sample receipt until sample disposal.

3.4 Analytical Methods

The individual plans in the CEMPP (Formation, 2015) present the analytical parameters that will be analyzed for each sample matrix collected during environmental monitoring activities. In an

effort to achieve consistency among the various individual plans of the CEMPP, the laboratory analysis methods listed in Table 2-7 of this QAPP will be used in the analysis of all environmental monitoring samples specified in the CEMPP. The analytical methods specified herein will provide quantitative results appropriate for the various intended uses of the data (refer to individual plans for the intended data uses, detection limit criteria [if any], and quantitation limit criteria for the specified analyses of environmental samples).

Sample preparations shall be in accordance with the USEPA SW-846 method specifications included in Table 2-7 as well as standard laboratory practices. Samples will be analyzed by laboratories that have quality management systems in place to address National Environmental Laboratory Accreditation Program (NELAP) standards for best laboratory practices. Sample preparation methods for non-standard matrices, including vegetation and biologic tissue samples, will be performed according to the laboratory's SOPs. Solid matrices such as sediment, soil, and vegetation shall be homogenized prior to analysis. Sediment, soil, vegetation, and tissue results typically shall be reported on a dry-weight basis. Percent moisture will also be reported for tissue samples to allow for future conversion of dry weight to wet weight concentrations, if necessary.

Water and soil samples will be analyzed for metals using EPA 6010 [inductively-coupled plasma (ICP)], EPA 6020 [inductively-coupled plasma-mass spectrometry (ICP-MS) equipped with collision cell/dynamic reaction cell], and EPA 7470A (cold-vapor atomic absorption (CVAA); mercury in water samples only). Biological tissue samples, including vegetation, will be analyzed for metals using EPA 6010, EPA 6020, and EPA 7742 (selenium only). Due to the complex sample matrix of the tissue samples, Simplot's current, contract laboratory for tissue analyses, ALS Environmental, recommends that EPA Method 7742 be used for selenium analysis in tissue samples. The monitoring parameters, analytical methods, method detection limits (MDLs), and QLs for each matrix are presented in Tables 2-8 (aqueous samples), 2-9 (soil/sediment samples), and 2-10 (biota and vegetation tissue samples) of this QAPP.

In addition to the metals and water-quality parameters specified for surface water and groundwater samples in Table 2-8, the IDEQ may request the analysis of gross alpha and gross beta for select groundwater samples. If requested, these analyses will be performed using EPA 9310 (gas flow proportional counting system), and the MDLs and QLs for these analytes are included in Table 2-8. Also, soils salvaged and stockpiled for use at Panels B and C may be analyzed for oxalate-extractable selenium, nitrate-nitrogen, and available phosphorus in order to select an adequate fertilizer for vegetation success (refer to Section 8 and Table 8-7 of the CEMPP). If these samples are collected, the appropriate analytical methods for these parameters will be determined at that time.

3.5 Quality Control

There is potential variability in any sample collection, analysis, or measurement activity. This section describes checks that will be performed to evaluate the variability and uncertainties associated with field and laboratory data collection methods.

3.5.1 Field Quality Control Samples

Field quality control samples are introduced into the measurement process to provide information on transport, storage and field handling biases and on field sampling precision. Equipment rinsate blanks, deionized (DI) water blanks, and field duplicate samples may be collected, depending on sample types and sampling methods (refer to Table 3-1). The equipment rinsate and DI water blanks should be identified to the laboratory so that they are not used for preparation of an analytical duplicate or matrix spike sample. Descriptions and frequencies of the three field QC sample types are provided below.

Equipment Rinsate Blank Samples

Analyses of equipment rinsate blanks quantify any artifacts introduced into the sample during collection. Potential sources of bias or cross-contamination include sampling gloves and sampling equipment that may incidentally come into contact with the sample. Equipment rinsates are submitted for laboratory analyses of the same suite of parameters as the associated samples.

An equipment rinsate consists of analyte-free, reagent-grade, DI water poured through the sampling equipment, collected in a clean sampling bottle, and preserved as needed. Equipment rinsate samples will be used to demonstrate that sampling devices have been adequately cleaned between uses and provide for representative samples.

Equipment rinsate blanks will be collected whenever sampling equipment is reused at multiple sampling locations. Equipment rinsate blanks are not necessary if dedicated and/or disposable sampling equipment is used for sampling. The equipment rinsates will be collected at the frequencies specified in Table 3-1, which vary depending on the total number of samples collected during a sampling event. In general, at least one equipment rinsate blank will be collected with every 20 samples; however, because events associated with most of the mine's routine monitoring programs involve collection of fewer than 20 samples per sampling event, the actual frequency for collection of equipment rinsates will typically be more than 1 in 20 samples.

De-Ionized Water Blank

A DI water blank consists of analyte-free, reagent-grade, DI water (same as used for equipment rinsate blank collection) poured into an unused, clean sample container and preserved as needed for the requested analyses. The purpose of the DI water blank is to characterize the

concentrations of target parameters in the clean water that is used to decontaminate sampling equipment and prepare equipment rinsate blanks. DI water blanks are submitted to the laboratory for analyses of the same suite of parameters as any associated samples.

DI water blanks will be collected whenever a new source of clean water is used for equipment decontamination or at least two times per year when the same source of DI water is used throughout the year.

Field Duplicates

Field duplicates are collected to measure the sampling and analytical variability associated with the sample results. Duplicate samples are usually collected simultaneously with or immediately after the corresponding original samples have been collected, depending on the sample type and medium and consistent with detailed instructions in the relevant SOPs for sample collection. In all cases, the same sampling protocol is used to collect the original sample and the field duplicate sample. The field duplicate is analyzed for the same suite of analytical parameters as the original sample. There are no USEPA criteria for evaluation of field duplicate sample comparability; however, the RPD between the original sample and field duplicate can be calculated for each parameter and compared to the precision goal of the method/project (refer to Tables 2-2 through 2-6). Field duplicate RPDs greater than the project-specified precision goal indicates a high variability associated with the sampling and analysis methods used.

Field duplicates will be collected at a rate of 1 per 10 samples by media and sample type, or a minimum of one per sampling event if less than 10 samples are collected. Field duplicates are not collected for vegetation or other biological tissue samples.

3.5.2 Laboratory Quality Control Samples

Laboratory quality control samples are introduced into the measurement process to evaluate laboratory performance and sample measurement bias. Control samples may be prepared from environmental samples or be generated from standard materials in the laboratory. The appropriate type and frequency of laboratory QC samples will be dependent on the sample media, analytical method, and the laboratory's SOP. Laboratory QC samples will be analyzed in addition to the calibration samples with each QC batch.

A laboratory method blank, laboratory control sample or standard reference material, analytical duplicate, and matrix spike sample should be run in each laboratory QC batch with a frequency of one each per 20 field samples. If less than 20 field samples are submitted, then one set of each of these QA/QC samples should still be run per batch. Field staff responsible for collection and shipping of samples to the laboratory shall designate the samples to be used for laboratory QC analyses on the COC/RA forms. In the event that such instructions are not included, the laboratory shall always utilize samples submitted from the Smoky Canyon environmental

monitoring program for preparation of laboratory duplicates and matrix spike samples used for batch QC analyses.

Method Blanks

Method blanks shall be used for the laboratory processes. A method blank is a volume of DI water or a specified weight of inert material for solid samples that is carried through the entire sample preparation and analysis procedure. The method blank volume or weight shall be approximately equal to the sample volumes or sample weights being processed. Method blanks are used to monitor interference caused by constituents in solvents and reagents and on glassware and other sampling equipment.

Project target analytes should not be detected in laboratory method blanks at concentrations greater than the QL. If method blank contamination is identified, it will be addressed in accordance with the response actions given in Tables 2-2 through 2-6, as appropriate to the analytical methods. Method blanks will be evaluated during the data validation process, and associated sample results may be qualified on the basis of blank contamination (refer to Section 5.2).

Laboratory Control Samples and Standard Reference Materials

A laboratory control sample (LCS), or a blank spike, is an aqueous or solid control sample of known composition that is analyzed using the same sample preparation, reagents, and analytical methods employed for the program samples. An LCS is obtained from an outside source or is prepared in the laboratory by spiking reagent water or a clean solid matrix for a stock solution that is different than that used for the calibration standards. The LCS is the primary indicator of process control used to demonstrate whether the sample preparation and analytical steps are in control, apart from sample matrix effects. LCS samples will be run with all water, soil, and sediment samples at the frequencies specified in Tables 2-2 through 2-6.

Reference materials, known as Standard Reference Materials (SRMs), are homogeneous and stable materials for which target analyte concentrations have been determined with a very high degree of certainty. SRMs are obtained from an outside entity and can serve the same function as LCSs for analyses of non-standard sample matrices such as vegetation and fish tissue. Analyses of SRMs are used to demonstrate whether sample preparation and analytical steps are in control for a matrix that is the same or similar to these types of non-standard sample matrices. Appropriate SRMs may be selected by the laboratory for analyses with tissue samples in place of, or in addition to, an LCS.

Analytical Duplicates

Analytical duplicates are samples that are split at some step in the measurement process and then carried through the remaining steps of the process. Duplicate analyses provide information on the precision of the operations involved.

- Analytical duplicates are a pair of subsamples from a field sample that are taken through the entire preparation and analysis procedure; any difference between the results indicates the precision of the entire method in the given matrix.

- For some analytes, the matrix spike may be duplicated to provide a matrix spike duplicate, which serves as the analytical duplicate sample.

Analyses of analytical duplicates and/or matrix spike duplicates monitor the precision of the analytical process. Analytical duplicates shall be run at the frequency specified in Tables 2-2 through 2-6 and sample results should fall within the prescribed control limits for relative percent difference or difference (refer to Tables 2-1 through 2-6).

Matrix Spikes

A matrix spike sample is prepared by adding an analyte to a subsample of a field sample before sample preparation and analysis. For multi-analyte methods, a representative suite of the analytes is used in the matrix spike. From the concentrations of the analyte in the spiked and unspiked samples, a percent recovery is calculated. Many samples show matrix effects in which other sample components interfere with the determination of the analyte. The value of the percent recovery indicates the extent of the interference.

Laboratory matrix spike samples are used to evaluate potential sample matrix effects on the accurate quantitation of an analyte using the prescribed analytical method. Percent recoveries of target analytes from matrix spike samples should fall within the prescribed control limits (refer to Tables 2-2 through 2-6). Matrix interference and other effects may cause low or high percent recoveries in investigative samples; matrix effects may be noted at the same time that recoveries from laboratory control samples indicate acceptable method performance.

Site-specific samples need to be used for MS/MSDs. Field sampling personnel will collect extra volume and designate on the COC forms the samples that are to be used for the MS/MSD. Every effort will be made to ensure that these samples are representative of the general sample matrix of samples collected on that sampling data. Equipment rinsate and DI water blank samples are not designated for MS/MSD.

Note that due to the wide range of analyte concentrations anticipated in most of the sample matrices submitted to the lab, the target spike concentrations may not always be achieved for all samples in a given sample delivery group.

3.6 Instrument/Equipment Testing, Inspection, and Maintenance

In order to ensure continual quality performance of any instruments or equipment, inspection and maintenance shall be performed and recorded as described in this section.

3.6.1 Field Equipment

Preventative maintenance of field equipment will include routine inspection and testing as specified in the relevant SOP or manufacturer's instructions. All field equipment will be cleaned and safely stored between each use, and any routine maintenance recommended by the equipment manufacturer will also be performed. Equipment will be inspected to certify that it is in good operating condition before it is transported to a field setting for use. When rental equipment is used for field measuring or sampling tasks, the equipment will be inspected and tested to ensure that it is in good operating condition before use. Additional testing, inspection, and maintenance information for specific field equipment instruments to be used for the environmental monitoring is provided in JRS SOP No. 31, Water Quality Meter Calibration, included as Appendix A of the CEMPP (Formation, 2015).

3.6.2 Laboratory Equipment

Instruments used by the laboratory will be maintained in accordance with the laboratory's Quality Assurance Plan and method requirements. All analytical measurement instruments and equipment used by the laboratories shall be controlled by a formal calibration and preventive maintenance program. In addition, each laboratory's preventive maintenance program shall include the following, as a minimum:

- a listing of the instruments and equipment;
- the frequency of maintenance considering manufacturer's recommendations and previous experience with the equipment; and
- a file for each instrument containing a list of spare parts maintained, external contracts, and a listing of the items to be checked or serviced during maintenance.

The laboratory will keep maintenance records and make them available for review, if requested, during laboratory audits. Laboratory preventative maintenance will include routine equipment inspection and calibration at the beginning of each day or each analytical batch, per the laboratory's internal SOPs and method requirements.

3.7 Instrument/Equipment Calibration and Frequency

In order to ensure continual quality performance of any instruments or equipment, calibration of the instruments or equipment shall be performed and recorded as described in this section.

3.7.1 Field Equipment

Field equipment, such as the pH meters, conductivity meters, digital thermometers, dissolved oxygen meters, and turbidity meters, will be utilized to measure water quality parameters during groundwater and surface water sampling. All field equipment designed to provide these measurements require daily calibration prior to use to ensure that the accuracy and reproducibility of the results are consistent with the manufacturer's specifications and the project's data needs. Field water quality sampling multi-parameter instruments shall be calibrated in accordance with JRS SOP No. 31, Water Quality Meter Calibration. Other field equipment shall be calibrated using the standards specified or provided by the equipment manufacturer. Equipment will be calibrated before use and field instruments that fail calibration requirements will be tagged as "nonfunctional" or "defective" and returned to the manufacturer or other supplier for repair or replacement.

3.7.2 Laboratory Equipment

Physical and chemical calibrations shall be performed within each laboratory as specified by the EPA methods, instrument manufacturer's guidelines, and the project's calibration requirements for the requested EPA methods, which are summarized in Tables 2-2 through 2-6. When laboratory measurement instruments do not meet the calibration criteria of the laboratory's Quality Assurance Plan and/or EPA method, then the instrument will not be used for analysis of samples submitted under this QAPP. Calibration records and demonstration of acceptable calibration results will be required elements of the laboratory's data reporting. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to QA audit.

3.8 Inspection/Acceptance of Supplies and Consumables

Supplies and consumables (e.g., sample bottles, calibration standards) received for field activities that will be conducted at remote locations (i.e., not local) will be checked for damage and other deficiencies that would affect their performance. Inspections should be documented and a copy of the inspection should be kept in the project's file.

3.9 Criteria for Use of Existing, Non-Direct Measurement Data

The intended uses of the environmental monitoring data generated in accordance with this plan are described in the individual plans in the CEMPP and also in planning documents prepared in accordance with the various Administrative Orders/Settlement Agreements listed herein. Previous environmental monitoring programs and environmental investigations provide a large quantity of existing chemical and other measurement data that may be relevant to the objectives of certain plans (e.g., comparing past conditions to current conditions). Historical information that is recorded or provided through data-collection programs that are outside of the scope of the CEMPP are considered "non-measurement data." Non-measurement data are often useful

for presentation of monitoring data (e.g., map layers) and for interpretation of monitoring data (e.g., preparing time-series analyses of chemical parameters at specific monitoring locations) and may be used to support the monitoring programs described in the CEMPP.

Data usability criteria developed for the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) were used to assign Data Usability Levels to existing environmental measurement data (refer to Section 2.3.7 of RI/FS QAPP for a description of the Data Usability Levels and appropriate data uses; Formation, 2010). Simplot documents and maintains the Data Usability Levels assigned to environmental records in a site-wide environmental monitoring database, which can be referred to for additional information regarding the quality of the historical data, also referred to here as "non-measurement data."

3.10 Data Management

The program quality records will be maintained by Simplot or their designated consultant/contractor. These records, either electronic or hard copy in form, shall include:

- The CEMPP (Formation, 2015), this QAPP, and any approved modifications, updates, and addendums associated with these two plans;
- Field documentation;
- COC records;
- Laboratory documentation (results received from the laboratory will be documented both in report form and in an electronic format);
- Data validation reports;
- Annual Environmental Monitoring Reports; and
- All other final project reports/deliverables specified in the CEMPP.

Hard-copy field and laboratory records shall be maintained in the project's central data file, where original field and laboratory documents are filed chronologically for future reference. These records are also scanned to produce electronic copies in *.pdf format. The electronic versions of these records will be maintained for automated backup, scheduled on a daily basis.

A key element of the project's data management process is maintenance of an electronic database that is used to store relevant environmental data, including existing data considered usable to support the CEMPP activities in a consistent, readily retrievable format. Microsoft® Access will be used for the data structure and query support, and a designated Database Manager will ensure the security and integrity of electronically stored data. The Smoky Canyon Mine's environmental monitoring database will be maintained on a central server system with data backup scheduled on a daily basis. The database incorporates, at a minimum, sample collection information (e.g., sample identification, location, date/time of sample collected, matrix) and laboratory analytical fields specified in the project EDD requirements (Table 2-11).

4.0 ASSESSMENT AND OVERSIGHT

Assessments of data collection and reporting activities are designed to verify that sampling and analyses are performed in accordance with the procedures established in the CEMPP and this QAPP. The audits of field and laboratory activities include two independent parts: internal and external audits. Internal audits may be performed by Simplot, their consultant, or a contracted laboratory. External audits may be performed by an appropriate regulatory agency. Procedures used to conduct internal and external audits shall be consistent with those described in *USEPA Guidance on Technical Audits and Related Assessments* (EPA QA/G-7; USEPA, 2000).

4.1 Field Performance and System Audits

Systems audits or surveillance may be conducted during the field investigations at the discretion of the Project Manager and QA Manager. Any non-conformances observed in the audit shall be documented and resolved. At least one field audit per field season is recommended.

4.1.1 Internal Field Audits

Internal audits of field activities, including sampling and field measurements, may be conducted by the QA Manager, or designee. These audits will verify that procedures established in the CEMPP and this QAPP, including referenced SOPs, are being followed.

The internal field audits (systems and performance audits) may include examination of field measurement and sampling records and field instrument operating records; sample collection, handling, decontamination, and packaging activities; and documentation of sampling activities in compliance with the established procedures for each field activity audited. Follow-up audits may be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the investigation. The results of field audits will be documented. The audited party will submit a reply addressing each finding cited in the documentation, the corrective action (if necessary) to be taken, and a schedule for implementation. The Field Supervisor is responsible for ensuring that corrective actions are taken.

4.1.2 External Field Audits

External field audits may be conducted by representatives from the appropriate regulatory agencies at any time during the field operations. These audits may or may not be announced and are at the discretion of the regulatory agencies. Results of an external field audit may document the need for a change to procedures in the CEMPP and/or QAPP and result in the need for an amendment to the CEMPP and/or QAPP.

4.2 Laboratory Performance and Systems Audits

4.2.1 Internal Laboratory Audits

The internal laboratory audit will be conducted by the QA Officer at each laboratory utilized for the environmental monitoring analyses. Audits will be performed in accordance with the laboratory's Quality Management Plan or Quality Assurance Manual. The internal laboratory system audits will be conducted on an annual basis while the internal lab performance audits will be conducted on a quarterly basis, or as specified in the laboratory's Quality Management Plan or Quality Assurance Manual.

The internal laboratory system audits will include an examination of laboratory documentation on sample receiving, sample log-in, sample storage, COC procedures, sample preparation and analysis, instrument operating records, etc. The performance audits may involve preparing blind QC samples and submitting them along with project samples to the laboratory for analysis throughout the project. The QA Officer from each laboratory utilized for this investigation will evaluate the analytical results of these blind performance samples to ensure the laboratory maintains acceptable QC performance.

4.2.2 External Laboratory Audits

An external laboratory audit may be conducted by representatives from Simplot or any of the regulatory agencies at any time. An external laboratory audit may be conducted prior to the initiation of the sampling and analysis activities. These audits may or may not be announced, and are at the discretion of the regulatory agencies.

External laboratory audits will include (but not be limited to) review of laboratory analytical procedures, laboratory on-site audits, and/or submission of performance evaluation samples to the laboratory for analysis. Typically, the external laboratory audit will be conducted in the laboratory so that the staff may be questioned regarding laboratory procedure. A recently produced sample data report will be compared with their SOP to ensure compliance with applicable standards.

4.3 Corrective Actions

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out-of-QC performance, which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation and data assessment.

Nonconforming equipment, items, activities, conditions and unusual incidents that could affect data quality and attainment of the project's quality objectives will be identified, controlled and reported in a timely manner. For the purpose of this QAPP, a nonconformance is defined as a

malfunction, failure, deficiency, or deviation that renders the quality of an item unacceptable or indeterminate in meeting the project's quality objectives.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. If the analytical results from laboratory QC samples fall outside of the measurement performance criteria, the laboratory should initiate corrective actions immediately. If the laboratory cannot correct the situation that caused the nonconformance and an out-of-control situation continues to occur or is expected to occur, then the laboratory will immediately contact the Project Manager or QA Manager and request instructions regarding how to proceed with sample analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with lab analysts and section leaders, it may be necessary for the Laboratory QA Officer to approve the implementation of corrective action. These conditions may include dilution of samples, additional sample-extract cleanup, automatic re-injection/re-analysis when certain QC criteria are not met, etc.

Completion of any corrective action should be evidenced by data once again falling within prescribed measurement performance criteria. If an error in laboratory procedures or sample collection and handling procedures cannot be found, the results will be reviewed by the QA Manager and Project Manager to assess whether reanalysis or re-sampling is required.

Any corrective actions taken will be documented in writing by either the Laboratory QA Officer or the QA Manager and reported to the Project Manager. Corrective action records will be included in the program's quality records.

4.3.1 Corrective Action during Data Validation and Data Assessment

The QA Manager may identify the need for corrective action during either the data validation or data assessment activities. Potential types of corrective action at this stage may include re-sampling by the field team, reanalysis of samples by the laboratory, or re-submission of laboratory data reports with corrected clerical errors. The appropriate and feasible corrective actions are dependent upon numerous variables, including the ability to re-mobilize the field team for resampling. Decisions regarding appropriate corrective actions will also consider the relative importance of the subject data for meeting the monitoring objectives as well as more specific QC goals (e.g., the holding time for samples is not exceeded, etc.). Corrective actions of this type will be documented by the QA Manager for notification of the Project Manager and to fully document the conditions for the corrective action as well as the actions taken.

4.4 Reports to Management

Simplot shall prepare and submit an Annual Environmental Monitoring Report (AEMR), as described in Section 13 of the CEMPP (Formation, 2015), to provide the results of each year's monitoring efforts. The annual report is in addition to the more frequent data reporting required

by some of the individual plans, as identified in Sections 2 through 12 of the CEMPP. These deliverables will contain QA discussions in which data quality information collected during the project is summarized. Those reports will be the responsibility of the Project Manager and QA Manager.

5.0 DATA REVIEW, VALIDATION AND USABILITY

5.1 Data Review, Verification, and Validation

The sections below address the final project checks conducted to confirm that the data obtained meet the project objectives and to estimate the effect of any deviations on data usability.

5.1.1 Field Data Review

Raw field data shall be entered in field notebooks; and/or sample collection record forms, which shall be reviewed for completeness by the Field Supervisor at the end of each day. Field data review will include verification that QC checks and calibrations are recorded properly in the field logbooks and/or data sheets and any necessary and appropriate corrective actions were implemented and recorded. The overall quality of the field data from any given sampling round shall be further evaluated during the process of data reduction and reporting. Field measurement data will be entered into electronic files for import to the Smoky Canyon Mine environmental monitoring database. Electronic files of field measurement data will be maintained as part of the project's quality records.

5.1.2 Laboratory Data Review

Internal laboratory data reduction procedures will be according to the laboratory's Quality Management Plan. QC data (e.g., laboratory duplicates, LCS, SRMs, MSs, and MSDs) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory computer system. Data summaries will be sent to the laboratory QA Manager for review. If approved, data are logged into the database format designated by Simplot or its data management consultant/contractor. The laboratory shall flag the results requiring additional explanation, with a key to the lab flags included in the data report prepared for Simplot.

5.1.3 Laboratory Data Reporting Requirements

The laboratories shall prepare final data reports for transmittal of results and associated quality control information to Simplot (and designated consultant, if any). The sample and quality control results will be reported in one of two data report formats, which are identified herein as "CLP-like" and "Standard" data reports. The reporting requirements for CLP-like and Standard data reports, and the frequency at which each data-report format will be prepared, are explained below.

5.1.3.1 CLP-Like Laboratory Reports

Laboratory data reports that are based on the USEPA's Contract Laboratory Program (CLP) Statement of Work are referred to here as "CLP-like reports." These reports provide sample

results, detailed QA/QC information, and raw instrument data that allow for the validation of the sample results in accordance with the procedures described in Section 5.2.2.1.

A minimum of 10% of the laboratory data reports produced annually by each of the laboratories that performs analyses of the environmental monitoring samples will be formatted and compiled in a format consistent with USEPA's CLP reports. The samples selected by Simplot for CLP-like reporting will be representative of the sample types submitted and analyses performed by each of the laboratories that support the environmental monitoring program. The laboratories will be notified prior to sample receipt, or on the COC, of the sample results to be reported in CLP Level IV data report format.

CLP-like laboratory reports will include the following information for each sample, at a minimum:

- Field and laboratory sample identification;
- Sample result, method detection limit, and reporting limit, with appropriate units;
- Sample collection and receipt dates;
- Sample preparation and analysis date/time;
- Dilution factor;
- Preparation and analysis batch numbers or identification;
- Sample matrix;
- Analytical method(s) references;
- Percent moisture determination; and
- For solid-matrix samples, identify basis of reporting (i.e., wet-weight or dry-weight basis).

The following additional information will also be provided, as applicable for the reported analytical methods:

- Case narrative;
- Copies of the signed COCs;
- Laboratory method/preparation blank;
- Initial calibration verification (ICV), and continuing calibration verification (CCV);
- Initial calibration blanks (ICB), and continuing calibration blank (CCB);
- Interference check sample, if applicable;
- Matrix spike (MS), and when applicable matrix spike duplicate (MSD), sample recovery and, when applicable, MS/MSD relative percent difference (RPD);
- Post-digest spike sample recovery;
- Laboratory duplicate;
- Laboratory control sample (LCS) recovery;

- ICP and ICPMS serial dilution percent differences;
- MDLs;
- ICP inter-element correction factors;
- ICP and ICPMS linear ranges;
- Preparation log;
- Analysis run log;
- Instrument raw data for verification;
- ICPMS tunes;
- ICPMS internal standards relative intensity summary;
- Sample log-in sheet; and
- Deliverables inventory sheet.

Concentrations equal to or greater than the MDL will be reported as numerical values. Concentrations between the MDL and QL will be flagged as estimated ("J" flag) by the laboratory. Parameters that are not detected or not present at concentrations equal to or greater than the MDL are flagged by the laboratory as "U" and interpreted to be not detected at a value equal to or greater than the MDL. Any non-detected value ("U" flagged) will be reported with its MDL and QL. Deviations from these specifications may be acceptable provided the hard-copy report presents all of the requested types of information in an organized, consistent, and readily reviewable format.

5.1.3.2 Standard Data Reports

The environmental monitoring program's Standard data reports provide sample results and QA/QC summaries that allow for the evaluation of data quality as described in Section 5.2.2.2. At a minimum, the Standard data reports prepared by the laboratories shall provide the following information for each sample:

- Field and laboratory sample identification;
- Sample result, method detection limit, and reporting limit, with appropriate units;
- Dilution factor
- Sample collection, receipt, and analysis dates;
- Analytical method(s) references; and
- Laboratory qualifiers and definitions.

In addition, Standard data reports shall include the following information in a QA/QC summary:

- Method blank results for each analyte;
- LCS results and laboratory control limits for each analyte;
- MS results and laboratory control limits for each analyte, if applicable;

- Analytical duplicate results and laboratory control limits for each target analyte(LCSD and/or MSD results may be provided instead of analytical duplicate results); and
- Confirmation of instrument calibration;
- Copies of the signed COCs.

Concentrations equal to or greater than the MDL will be reported as numerical values. Concentrations between the MDL and QL will be flagged as estimated ("J" flagged) by the laboratory. Parameters that are not detected or not present at concentrations equal to or greater than the MDL are flagged by the laboratory as "U" and interpreted to be not detected at a value equal to or greater than the MDL. Any non-detected value ("U" flagged) will be reported with its MDL and QL.

5.1.4 Laboratory Electronic Data Deliverable

Each data report, as described above, shall be accompanied by an electronic data deliverable (EDD) prepared by the laboratory. The content and format of laboratory electronic data deliverables (EDDs) are specified in Table 2-11. Additional laboratory QC data can be included in the EDD as long as the data fields specified in Table 2-11 are also maintained.

EDDs will be cross checked against corresponding data reports to confirm consistency in results reported in these two separate and distinct formats. This cross check will take place as part of the data quality review process described in Section 5.2 below.

5.2 Data Validation and Data Quality Review

Data validation is the process of verifying that qualitative and quantitative information generated relative to a given sample is complete and accurate. Data validation procedures shall be performed for both field and laboratory operations as described below.

5.2.1 Evaluating Field Data

The results of field quality control sample analyses associated with each laboratory data report will be reviewed to allow for evaluation of equipment blanks and other field QC samples and further indications of the data quality. If a problem is identified through the review of field QC data, all related field samples will be identified and, if possible, corrective actions can be instituted and documented. If data are compromised due to a problem identified via field QC sample review, appropriate data qualifications will be used to identify the data for future data users.

5.2.2 Evaluating Laboratory Chemistry Data

The purpose of chemistry data validation is to verify that the data are of known quality (i.e., thoroughly documented, with such documentation being verifiable and defensible), technically valid, and usable for their intended purpose (USEPA, 1990). Data validation protocols to be

performed for the CLP-like and Standard data reports are described below in Sections 5.2.2.1 and 5.2.2.2, respectively.

Data validation results for the CLP-like data reports will be reviewed to identify any systemic analytical laboratory issues which could affect the data quality in the Standard data reports. Any such issues will be identified and reported to the laboratory. Reanalysis of samples or other corrective actions may be warranted, as determined by the QA Manager. The QA Manager will coordinate the resolution of any necessary corrective actions resulting from data validation activities. The process for implementing corrective actions is discussed in Section 4.3.

5.2.2.1 Evaluating CLP-Like Data Reports

A minimum of 10% of the data reports produced annually by each laboratory analyzing environmental monitoring samples will be reported as CLP-like data reports and validated according to the data validation procedures described in this section. Data validation of the CLP-like data reports will be performed using the general protocols and processes described in the following documents, as applicable to the method calibration and QC limits specified on Tables 2-2 through 2-5 and to the extent possible when certain non-CLP methods are used:

- Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (NFG; USEPA, 2010); and
- Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (USPEA, 2009).

The data validator will perform a Manual Validation, as defined in the USEPA guidance for labeling externally validated data (USEPA, 2009), on the hard copy data reports prepared by the laboratories. Data validation will be equivalent to a "USEPA CLP Level IV" validation and essentially the same as “Tier 2/Stage 4 Validation” (USEPA, 2009). Data review and validation protocols are provided in JRS SOP No. 20, Inorganic Data Evaluation, included as Attachment 1 of this QAPP.

Data validation protocols and results will be documented on checklists, worksheets, or summary documents (refer to the example checklist in Attachment 1 of this QAPP). The data validation documents will indicate data qualifiers applied to individual results, if necessary, and reasons for application of those qualifiers. Definitions of the data qualifiers that may be applied to individual results as a result of data validation are as follows:

U A concentration was reported at a level less than the MDL.

J The reported concentration is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ The reported concentration is an estimated quantity, but the result may be biased high.

J- The reported concentration is an estimated quantity, but the result may be biased low.

R The reported concentration is not usable. The result is rejected due to serious deficiencies in meeting quality control criteria.

UJ A concentration was reported but the result is an estimated value less than the QL. In addition, the reported quantitation limit may be inaccurate or imprecise.

The following "Reason Codes" will be applied as applicable to the validated data:

1 Holding Time
2 Sample Preservation (including receipt temperature)
3 Sample Custody
4 Missing Deliverable
5 ICPMS Tune
6 Initial Calibration
7 Initial Calibration Verification
8 Continuing Calibration Verification
9 Low-Level Calibration Check Sample
10 Calibration Blank
11 Laboratory or Preparation Blank
12 ICPMS or ICP Interference Check Standard
13 Laboratory Control Sample or Laboratory Control Sample Duplicate Recovery
14 Laboratory Control Sample Precision
15 Laboratory Duplicate Precision
16 Matrix Spike or Matrix Spike Duplicate Recovery
17 Matrix Spike/Matrix Spike Duplicate Precision
18 ICPMS or ICP Serial Dilution
19 ICPMS Internal Standard
20 Field Replicate Precision
21 Equipment Rinsate Blank
22 Linear Range Exceeded
23 Other reason
24 Result is less than the MDC
25 Result is less than two times the error

Simplot (or their consultant) will provide the laboratory EDDs to the data validator to populate with qualifiers and reason codes upon completion of validation. The updated EDDs will be returned to Simplot, or their consultant, for incorporation into the Smoky Canyon Mine environmental monitoring database.

5.2.2.2 Evaluating Standard Data Reports

Standard data reports will be evaluated for data quality according to the procedures described in JRS SOP No. 20 (Rev. 1; Attachment 1 to this QAPP), as applicable to the method QC limits specified on Tables 2-2 through 2-6 and to the extent possible when certain non- CLP methods are used. The procedures described in JRS SOP No. 20 (Rev. 1) are consistent with protocols specified in the EPA NFGs (USEPA, 2010) for review of the following items:

- Presence and completeness of COC and sample receipt documentation;
- Laboratory Case Narrative (if provided);
- Analytical holding times;
- Method blank;
- Field blank (if applicable);
- Matrix spike recoveries;
- Matrix spike/matrix spike duplicate RPD values (if applicable);
- Field duplicate RPD values;
- Laboratory Duplicate RPD values;
- Review of Laboratory Control Samples (LCS);
- Completeness of laboratory documentation for sample receipt, sample analysis, and sample result reporting.

The data-review protocol (e.g., EPA's NFGs or JRS SOP No. 20) used and results of that review will be documented on checklists, worksheets, or summary documents. These documents will indicate any data qualifiers applied to individual results and reasons for application of those qualifiers. Definitions of the data qualifiers and Reason Codes that may be applied to individual results are described in Section 5.2.2.1 above.

5.3 Data Usability

Even though the data review procedures applied to Standard data reports do not include all elements of the NFGs data validation, data reviewed and qualified in accordance with the Standard data-report review requirements, as specified herein, will be equivalent to the validated CLP-like data reports in terms of their usability in meeting the mine's environmental monitoring requirements, including requirements associated with CERCLA-type investigations and response actions, as long as 10 percent of data collected were reported in CLP-like data reports and validated. Validation of the 10 percent CLP-like data reports will provide adequate

information regarding data quality to support this data usability for the remaining 90 percent Standard data reports provided by the same laboratories.

5.4 Reconciliation with User Requirements

Once validated, the field and laboratory data will be loaded into the Smoky Canyon Mine environmental monitoring database. Measurement data will be reported in consistent units for each sample matrix to maintain comparability and facilitate data analyses. Concentrations of solid matrices shall be expressed in terms of weight per unit weight with the moisture basis specified such as milligram per kilogram (e.g., mg/kg wet wt). Statistical analyses and other evaluations may be performed using the validated data set. Records stored by the environmental monitoring database for each parameter concentration, in each sample, will provide the following information for reference by data users:

- any qualifiers applied to the concentration result by the laboratory and/or data validators;
- MDL and QL values associated with the result;
- the detect status (i.e., detected or not detected) of each result relative to the MDL and QL; and
- the original detected values for results below the QL.

6.0 REFERENCES

Bureau of Land Management (BLM) and USDA Forest Service (USFS), 2002. Final Supplemental Environmental Impact Statement, Smoky Canyon Mine Panels B and C. Prepared by JBR Environmental Consultants, Inc., Sandy, UT. BLM, Pocatello Field Office, Pocatello, ID. USFS, Caribou-Targhee National Forest. April 2002.

BLM and USFS, 2002. Record of Decision, Environmental Impact Statement, Smoky Canyon Mine Panels B&C.

BLM, 2008. Record of Decision, Environmental Impact Statement, Smoky Canyon Mine, Panels F & G. June 6, 2008.

Formation Environmental, 2010. Final RI/FS Sampling and Analysis Plan (SAP), including Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), and Health and Safety Plan (HASP), prepared for J.R. Simplot Company, June. Incorporates SAP Addendum 01 (May 2011), SAP Addendum 02 (August 2011), SAP Addendum 03 (October 2011 and February 2012), SAP Addendum 04 (November 2012), SAP Addendum 05 (October and November 2014), SAP Addendum 06 (November 2014), and SAP Addendum 07 (August 2015).

Formation Environmental, 2015. Draft Revision No. 4 Comprehensive Environmental Monitoring Program Plan (CEMPP), Smoky Canyon Mine Site, prepared for J.R. Simplot Company. March.

J.R. Simplot Company, 1981. Surface Mine and Reclamation Plan, Smoky Canyon Project, Federal Phosphate Lease I-012890. January 1981.

U.S. Environmental Protection Agency (USEPA), Quality Assurance/Quality Control Guidelines for Removal Activities, EPA/540/G-90/004, OSWER Directive 9360.4-01, April 1990.

USEPA, 2000. Guidance on Technical Audits and Related Assessments, EPA QA/G-7.

USEPA, 2001. Requirements for Quality Assurance Project Plans EPA QA/R-5. EPA 240-B-01-003. March.

USEPA, 2002. Guidance for Quality Assurance Project Plans EPA QA/G-5. EPA 240-R-02-009. December.

USEPA, 2010. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. EPA 540-R-10-011. January.

USEPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4, EPA/240/B-06/001. February.

USEPA, 2009. USEPA Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. EPA 540-R-08-005. January.

USDA Forest Service and Bureau of Land Management (USFS and BLM), 1982. Final Environmental Impact Statement for Smoky Canyon Mine.

USFS and BLM, 2007. Smoky Canyon Mine Panels F & G, Final Environmental Impact Statement. Prepared by JBR Environmental Consultants, Inc., Sandy, UT. Caribou-Targhee National Forest and BLM Idaho State Office. October 2007.

USFS, 2008. Smoky Canyon Mine Panels F & G Authorization for Off-Lease Activities. Record of Decision. Caribou-Targhee National Forest and BLM Idaho State Office. June 2008.

QUALITY ASSURANCE PROJECT PLAN - TABLES

TABLE 2-1

Precision, Accuracy and Completeness Calculation Equations

Characteristic	Formula	Symbols
Precision (as relative percent difference, RPD)	$RPD = \frac{\left\|x_i - x_j\right\|}{\left(\frac{x_i + x_j}{2}\right)} \times 100$	x_i, x_j: replicate values of x
Precision (as relative standard deviation, RSD, otherwise known as coefficient of variation)	$RSD = \frac{s}{\bar{x}} \times 100$	s: sample standard deviation $\bar{x}$: sample mean
Accuracy (as percent recovery, R, for samples without a background level of the analyte, such as reference materials, laboratory control samples, and performance evaluation samples)	$R = \frac{x}{t} \times 100$	x: sample value t: true or assumed value
Accuracy (as percent recovery, R, for measurements in which a known amount of analyte, a spike, is added to an environmental sample)	$R = \frac{x_s - x}{t} \times 100$	x_s: value of spiked sample x: value of unspiked sample t: true or assumed value
Completeness (as a percentage, C)	$C = \frac{n}{N} \times 100$	n: number of valid data points produced N: total number of samples taken

TABLE 2-2

Summary of Calibration and QC Procedures for EPA Method 6020A (ICPMS)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria
MS tuning sample	Prior to initial calibration, solution as specified by laboratory SOP.	Mass calibration < 0.1 amu from the true value; RSDs < 5% per EPA Method 6020 criteria.	Retune instrument then reanalyze tuning solution.
Initial calibration (ICAL) for all target analytes (minimum one standard and a blank)	Daily initial calibration prior to sample analysis	Calibration blank plus 1 or more non-zero standards; a minimum of 3 replicate integrations are required and the average shall be used.	Correct problem then repeat initial calibration.
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source).	All analytes within ± 10% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.
Initial Calibration Blank (ICB)	After ICV	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem and reanalyze.
QL Check Standard (CRI)	Daily, after ICAL, after every 20 samples and at end of each analysis run.	Laboratory limits or within ± 30% of expected value for all analytes except Co, Mn and Zn (± 50%).	Correct problem then reanalyze.
Interference Check Solution A & AB (ICS-A & ICS-AB)	At the beginning of an analytical run (not before the ICV) and immediately followed by a CCV/CCB.	ICS-A and ICS-AB: ±3xQL or ±20% (whichever is greater).	Correct problem and reanalyze.
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration).	The analyte within ± 10% of expected value.	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence.	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem then reanalyze calibration blank and previous 10 samples.
Method Blank (or preparation blank)	One per analytical batch.	Absolute value ≤ QL for each analyte, or lab control limit (whichever is less).	If absolute value is >QL all sample results (excluding field blanks) must be ≥10x the blank concentration. Otherwise, all samples associated with the blank and <10x blank concentration must be redigested and reanalyzed.
Laboratory Control Sample (LCS) or Standard Reference Material (SRM) for all analytes	One LCS/SRM per analytical batch.	Aqueous/Soil/Sediment LCS: 80% - 120% or vendor-specified control limits (but not wider than 80-120% recovery). Tissue SRM: vendor-specified control limits.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS/SRM and all samples in the preparation batch.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix - not to be performed using a field blank. MSDs not required for tissues.	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD < 20%). MS/MSD recoveries are not applicable if the sample concentration (used for spiking) is >4x the spike concentration.	Flag associated sample results and perform post-digestion spike addition (not required if only MSD is outside limits). Post-digestion spike control limits are 80% - 120%.
Analytical duplicate sample	One duplicate per every 20 samples per matrix. For Standard data reports, MSDs may be analyzed in place of an analytical duplicate if acceptable per method and lab SOP.	RPD <20% for aqueous samples (35% for soils/sediments/tissues) if sample and duplicate concentrations ≥5xQL. If sample and/or duplicate concentration <5xQL the control limit will be a difference of ±QL for aqueous samples (±2xQL for soils/sediments/tissues).	Flag associated sample results.
Field duplicate sample	See Table 3-1.	Not applicable	Not applicable for lab. Project control limits will be RPD <20% for aqueous samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±QL (if sample and/or duplicate <5xQL). Project control limits will be RPD <50% for soil/sediment/tissue samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±2xQL (if sample and/or duplicate <5xQL).
Serial dilution (SD) test	One SD sample per every 20 samples	Fivefold dilution must agree within ± 10% of the original determination if analyte concentration is >50xMDL.	Flag associated sample results.
Internal Standards (IS)	Every sample; internal standards as specified by method and lab SOP.	70% - 130% of intensity in the calibration blank.	Dilute fivefold and re-analyze until IS recoveries within limits.
Concentrations between the MDL and CRQL	All samples	Not applicable	Flag as estimated value ("J" flag)

Note that specific QC procedures may vary based on the laboratory that performs the analyses. Laboratories will be directed to adopt these specifications, to the extent possible.

MDL - Method detection limit

QL - Quantitation Limit is the lowest concentration at which the analyte can not only be reliably detected but at which the laboratory's predefined goals for bias and precision are met. May also be referred to by laboratories as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

RPD - Relative percent difference

TABLE 2-3

Summary of Calibration and QC Procedures for EPA Method 6010C (ICP)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria
Initial calibration (ICAL) for all target analytes (minimum one standard and a blank)	Daily initial calibration prior to sample analysis	Calibration blank plus 1 or more non-zero standards	Correct problem then repeat initial calibration.
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run	All analytes within ± 10% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.
Initial Calibration Blank (ICB)	After ICV	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem and reanalyze.
QL Check Standard (CRI)	Daily, after ICAL, after every 20 samples and at end of each analysis run.	The analyte(s) within ±30% of expected value except for Sb, Pb and Tl (± 50%).	Correct problem then reanalyze.
Interference Check Solution A & AB (ICS-A & ICS-AB)	At the beginning of an analytical run	ICS-A and ICS-AB: ±2xQL or ±20% (whichever is greater).	Correct problem and reanalyze ICS-A and ICS-AB.
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within ± 10% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem then reanalyze calibration blank and previous 10 samples.
Method Blank (or preparation blank)	One per analytical batch	Absolute value ≤ QL, or lab control limit (whichever is less).	If absolute value is >QL all sample results (excluding field blanks) must be ≥10x the blank concentration. Otherwise, all samples associated with the blank and <10x blank concentration must be redigested and reanalyzed.
Laboratory Control Sample (LCS) or Standard Reference Material (SRM) for all analytes	One LCS/SRM per analytical batch	Aqueous/Soil/Sed LCS: 80-120% or vendor-specified control limits (but not wider than 80-120% recovery; except for aqueous Sb and Ag which may have other control limits). Tissue SRM: vendor-specified control limits.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS/SRM and all samples in the preparation batch.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS/MSD per every 20 samples per matrix - field blanks may not be used. MSDs not required for tissues.	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD < 20). MS/MSD recoveries are not applicable if the sample concentration (used for spiking) is >4x the spike concentration.	Flag associated sample results and perform post-digestion spike addition if required by method/lab SOP.
Analytical duplicate sample	One duplicate per every 20 samples per matrix. For Standard data reports, MSDs may be analyzed in place of an analytical duplicate if acceptable per method and lab SOP.	RPD <20% for aqueous samples (35% for soils/sediments/tissues) if sample and duplicate concentrations ≥5xQL. If sample and/or duplicate concentration <5xQL, the control limit will be a difference of ±QL for aqueous samples (±2xQL for soils/sediments/tissues).	Flag associated sample results.
Field duplicate sample	See Table 3-1.	Not applicable	Not applicable for lab. Project control limits will be RPD <20% for aqueous samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±QL (if sample and/or duplicate <5xQL). Project control limits will be RPD <50% for soil/sediment/tissue samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±2xQL (if sample and/or duplicate <5xQL).
Serial dilution (SD) test	One SD sample per every 20 samples.	Fivefold dilution must agree within ± 10% of the original determination if analyte concentration is >50xMDL.	Flag associated sample results.
Concentrations between the MDL and QL	All samples	Not applicable	Flag as estimated value ("J" flag)

Note that specific QC procedures may vary based on the laboratory that performs the analyses. Laboratories will be directed to adopt these specifications, to the extent possible.

MDL - Method detection limit

QL - Quantitation Limit is the lowest concentration at which the analyte can not only be reliably detected but at which the laboratory's predefined goals for bias and precision are met. May also be referred to by laboratories as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

RPD - Relative percent difference

TABLE 2-4

Summary of Calibration and QC Procedures for EPA Method 7470A (CVAA)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria
Initial calibration (ICAL) for all target analytes (minimum five standards including a blank)	Daily initial calibration prior to sample analysis	Blank plus 4 or more calibration concentrations, correlation coefficient (r) ≥ 0.995	Correct problem then repeat initial calibration.
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run (at a concentration other than used for calibration and from a second source)	All analytes within ± 20% of expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.
Initial Calibration Blank (ICB)	After ICV	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem and reanalyze.
CRQL Check Standard (CRI)	Daily, after ICAL, after every 20 samples and at end of each analysis run.	Within ± 30% of expected value.	Correct problem then reanalyze.
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence (at a mid-calibration range concentration)	The analyte within ± 20% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem then reanalyze calibration blank and previous 10 samples.
Method Blank (or preparation blank)	One per analytical batch	Absolute value ≤ QL, or lab control limit (whichever is less).	If absolute value is >QL all sample results (excluding field blanks) must be ≥10x the blank concentration. Otherwise, all samples associated with the blank and <10x blank concentration must be redigested and reanalyzed.
Laboratory Control Sample (LCS)	One LCS per analytical batch.	Aqueous LCS: 80-120% or vendor-specified or laboratory-determined control limits (but not wider than 80-120% recovery).	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS and all samples in the preparation batch.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	One MS per every 20 samples per matrix - field blanks may not be used. MSDs if analytical duplicate not analyzed.	Laboratory-determined control limits (but not wider than 75-125% recovery and RPD <20%). MS/MSD recoveries are not applicable if the sample concentration (used for spiking) is >4x the spike concentration.	Flag associated sample results.
Analytical duplicate sample	One duplicate per every 20 samples per matrix. For Standard data reports, MSDs may be analyzed in place of an analytical duplicate if acceptable per method and lab SOP.	RPD <20% if sample and duplicate concentrations ≥5xQL. If sample and/or duplicate concentration <5xQL the control limit will be a difference of ±QL.	Flag associated sample results.
Field duplicate sample	See Table 3-1.	Not applicable	Not applicable for labs. Project control limits will be RPD <20% for aqueous samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±CRQL (if sample and/or duplicate <5xQL).
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)

Note that specific QC procedures may vary based on the laboratory that performs the analyses. Laboratories will be directed to adopt these specifications, to the extent possible.

MDL - Method detection limit

QL - Quantitation Limit is the lowest concentration at which the analyte can not only be reliably detected but at which the laboratory's predefined goals for bias and precision are met. May also be referred to by laboratories as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

RPD - Relative percent difference

TABLE 2-5

Summary of Calibration and QC Procedures for EPA Method 7742 (AA)

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria
Initial calibration (ICAL) for all target analytes	Daily initial calibration prior to sample analysis	5 or more calibration concentrations including a blank, correlation coefficient (r) ≥ 0.995.	Correct problem then repeat initial calibration.
Initial Calibration Verification (ICV)	After ICAL, before beginning a sample run	All analytes within ± 10% of expected value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.
Initial Calibration Blank (ICB)	After ICV	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem and reanalyze.
Low-level calibration check standard	Daily, after ICAL (at a concentration ≤ QL)	The analyte within ± 30% of expected value	Correct problem and reanalyze.
Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence	The analyte within ± 10% of expected value	Correct problem then repeat CCV and reanalyze all samples since last successful CCV.
Continuing Calibration Blank (CCB)	Before beginning a sample run, after every 10 samples, and at end of the analytical sequence	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem then reanalyze calibration blank and previous 10 samples.
Method Blank (or preparation blank)	One per analytical batch	Absolute value ≤ QL, or lab control limit (whichever is less).	Correct problem. Corrective actions determined by lab which may including system cleaning, re-extraction and reanalysis.
Laboratory Control Sample (LCS) or Standard Reference Material (SRM)	One LCS/SRM per analytical batch	Vendor-specified control limits.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS/SRM and all samples in the preparation batch.
Analytical spikes; Method of Standard Addition (MSA)	One analytical spike per sample	Recovery >40%	Correct problem and reanalyze.
Matrix Spike	One MS per every 20 samples per matrix	Laboratory-determined control limits (but not wider than 75-125%). MS recoveries are not applicable if the sample concentration (used for spiking) is >4x the spike concentration.	Flag associated sample results.
Post-digestion spike addition	If MS/MSD fails (method 3114C only)	Recovery within laboratory-determined control limits (but not wider than 75-125%).	Perform dilution test.
Analytical duplicate sample	One duplicate per every 20 samples per matrix	RPD <30% if sample and duplicate concentrations ≥5xQL. If sample and/or duplicate concentration <5xQL the control limit will be a difference of ±QL.	Flag associated sample results.
Field duplicate sample	See Table 3-1.	Not applicable	Not applicable to lab. Project control limits will be RPD <50% for tissue samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±2xQL (if sample and/or duplicate <5xQL).
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)

Note that specific QC procedures may vary based on the laboratory that performs the analyses. Laboratories will be directed to adopt these specifications, to the extent possible.

MDL - Method detection limit

QL - Quantitation Limit is the lowest concentration at which the analyte can not only be reliably detected but at which the laboratory's predefined goals for bias and precision are met. May also be referred to by laboratories as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

RPD = Relative percent difference

TABLE 2-6

Summary of Calibration and QC Procedures for EPA Method 9310

Quality Control Check	Minimum Frequency	Lab Acceptance Criteria	Corrective Action/Lab Flagging Criteria
Initial calibration (ICAL) for all target analytes	Per method specifications and laboratory SOP	Per method specifications and laboratory SOP.	Correct problem then repeat initial calibration.
Method Blank (or preparation blank)	One per analytical batch	Absolute value ≤ QL, or lab control limit (whichever is less).	If absolute value is >QL all sample results (excluding field blanks) must be either non-detect or ≥10x the blank concentration. Otherwise, all samples associated with the blank and <10x blank concentration must be redigested and reanalyzed.
Laboratory Control Sample (LCS)	One LCS per analytical batch	Laboratory control limits will be determined based on observed standard deviations, and the control limits will be reported with the LCS results.	Correct problem then reanalyze. If still out, re-prepare and reanalyze the LCS and all samples in the preparation batch.
Matrix Spike (MS)	One MS per every 10 samples per matrix - not to be performed using a field blank	Laboratory control limits will be determined based on observed standard deviations, and the control limits will be reported with the LCS results.	Flag associated sample results
Analytical duplicate sample (may be LCSD and/or MSD, per lab SOP)	One duplicate per every 10 samples per matrix	RPD <20% (aqueous samples) if sample and duplicate concentrations ≥5xQL. If sample and/or duplicate concentration <5xQL the control limit will be a difference of ± QL (aqueous samples). If the laboratory's control limits differ from the 20% control limits, they may be used.	Flag associated sample results.
Field duplicate sample	See Table 3-1.	Not applicable	Not applicable for labs. Project control limits will be RPD <20% for aqueous samples (if sample and duplicate concentrations are ≥5xQL) or a difference of ±QL (if sample and/or duplicate <5xQL).
Concentrations between the MDL and RL	All samples	Not applicable	Flag as estimated value ("J" flag)

Note that specific QC procedures may vary based on the laboratory that performs the analyses. Laboratories will be directed to adopt these specifications, to the extent possible.

MDL - Method detection limit

QL - Quantitation Limit is the lowest concentration at which the analyte can not only be reliably detected but at which the laboratory's predefined goals for bias and precision are met. May also be referred to by laboratories as "PQL" - Practical Quantitation Limit or "RL" - Reporting Limit.

RPD - Relative percent difference

TABLE 2-7

Requirements for Sample Preservation and Preparation Techniques, Sample Volumes, and Holding Times

Monitoring Parameter	Analysis Method	Sample Preparation Method	Preservative[1]	Minimum Sample Amount	Maximum Holding Time (Days)
Solid Matrices (Sediment, Soil)					
Metals (refer to QAPP Table 2-9 for complete list)	EPA 6010C and EPA 6020A (ICP and ICP-MS)	Total Digestion-hot plate (M3050B) for sediment and soil; closed vessel digestion	None	5 g	180
Soil nutrients (refer to QAPP Table 2-9)	Refer to QAPP Table 2-9	Refer to QAPP Table 2-9	None	25 g	NA[2]
Tissue Matrices (Vegetation, Biological)					
Metals (refer to QAPP Table 2-10 for complete list)	EPA 6010C and EPA 6020A (ICP and ICP-MS)	Total Digestion-hot plate (M3050B) for vegetation	None	5 g	180
Water Matrices (Surface Water, Groundwater)					
Metals (except mercury; refer to Table 2-8)	EPA 6010C and 6020A (ICP and ICP-MS)	Unfiltered (total); Hot Plate Digestion 3005A (6010B) or 3020A (6020)	HNO_3	500 mL	180
Mercury	EPA 7470A	Unfiltered (total); preparation per method 7470A	HNO_3	50 mL	28
Chloride, Sulfate, Fluoride	EPA 300.0 (Ion Chromatography)	None	None	50 mL	28
Nitrate+nitrite, as N	EPA 353.2	None	H_2SO_4	50 mL	28
Alkalinity (Alkalinity, Bicarbonate Carbonate, Hydroxide), TDS, TSS	SM 2320B (Titration), SM 2540C (TDS), SM 2540D (TSS)	None	None	100 mL	14 (Alkalinity) 7 (TDS, TSS)
Gross alpha and gross beta	EPA 9310	None	HNO_3	100 mL	180
Total P	SM 4500-P-E	None	H_2SO_4	100 mL	28

Notes:

[1]In addition to the preservation listed, all samples shall be maintained at $4^{o} \pm 2^{o}C$ or frozen (biological tissues) following collection and during shipment to the lab.

[2]Maximum holding time is not applicable to this method.

TABLE 2-8

Laboratory Analysis Methods and Achievable Laboratory Limits, Regulatory Standards, and Screening Values
Surface Water and Groundwater Parameters

Analysis Method	Monitoring Parameter [1]	Units	Achievable Laboratory Limits [2]		State of Idaho Standards				Federal Drinking Water MCL[6]		National Recommended Water Quality Criteria -Aquatic Life[7, p]	
					Ground Water[3]	Surface Water [4]	Aquatic Life [5]					
			MDL	QL			Acute	Chronic	Primary	Secondary[s]	Acute	Chronic
EPA 6020 A	Antimony	mg/L	0.0001	0.003	0.006	0.0056	- -	- -	0.006	- -	- -	- -
	Arsenic	mg/L	0.00034	0.003	0.05	0.010	0.34[a]	0.15[a]	0.01	- -	0.34	0.15
	Barium	mg/L	0.0001	0.001	2	- -	- -	- -	2	- -	- -	- -
	Beryllium	mg/L	0.000074	0.0002	0.004	- -	- -	- -	0.004	- -	- -	- -
	Cadmium	mg/L	0.00003	0.002	0.005	- -	0.0013[c]	0.0006[c]	0.005	- -	0.0020[d]	0.00025[d]
	Chromium	mg/L	0.00018	0.0015	0.1	- -	0.57[c, e]	0.074[c, e]	0.1	- -	0.57[d, e]	0.074[d, e]
	Cobalt	mg/L	0.000035	0.001	- -	- -	- -	- -	- -	- -	- -	- -
	Copper	mg/L	0.000061	0.001	1.3	- -	0.017[c]	0.011[c]	1.3 [v]	1.0	0.013[d]	0.0090[d]
	Lead	mg/L	0.000048	0.001	0.015	- -	0.065[c]	0.0025[c]	0.015 [v]	- -	0.065[d]	0.0025[d]
	Manganese	mg/L	0.000026	0.001	(0.05)	- -	- -	- -	- -	0.05	- -	- -
	Molybdenum	mg/L	0.00013	0.001	- -	- -	- -	- -	- -	- -	- -	- -
	Nickel	mg/L	0.00041	0.001	- -	0.61	0.47[c]	0.052[c]	- -	- -	0.47[d]	0.052[d]
	Selenium	mg/L	0.00026	0.005	0.05	0.17	0.020[g]	0.005[f,g]	0.05	- -	notes[n,k]	0.0050[k]
	Silver	mg/L	0.000012	0.0001	(0.1)	- -	0.0034[c]	- -	- -	0.10	0.0032[d]	- -
	Thallium	mg/L	0.00001	0.001	0.002	0.00024	- -	- -	0.002	- -	- -	- -
	Uranium [8]	mg/L	0.00001	0.001	- -	- -	- -	- -	0.03	- -	- -	- -
	Vanadium	mg/L	0.00018	0.003	- -	- -	- -	- -	- -	- -	- -	- -
	Zinc	mg/L	0.00063	0.005	(5)	7.4	0.12[c]	0.12[c]	- -	5	0.12[d]	0.12[d]
EPA 6010 C	Aluminum	mg/L	0.031	0.08	(0.2)	- -	- -	- -	- -	0.05 - 0.2	- -	- -
	Boron	mg/L	0.02	0.05	- -	- -	- -	- -	- -	- -	- -	- -
	Calcium	mg/L	0.015	0.1	- -	- -	- -	- -	t	t	- -	- -
	Iron	mg/L	0.023	0.06	(0.3)	- -	- -	- -	- -	- -	- -	- -
	Magnesium	mg/L	0.039	0.2	- -	- -	- -	- -	t	t	- -	- -
	Potassium	mg/L	0.11	0.5	- -	- -	- -	- -	t	t	- -	- -
	Sodium	mg/L	0.11	0.5	- -	- -	- -	- -	t	t	- -	- -
EPA 7470A	Mercury	mg/L	0.000045	0.0002	0.002	- -	- -	- -	0.002	- -	0.0014	0.00077
EPA 9310	Gross alpha	pCi/L	0.8	1								
	Gross beta	pCi/L	1.6	2								
SM 2320B /2310B	Alkalinity	mg/L	NA	1.0								
EPA 6010C/SM 2340B	Hardness	mg/L	NA	NA								
SM 4500-P-E	Total P	mg/L	0.0047	0.01								
EPA 300.0	Chloride	mg/L	0.061	0.2	(250)	- -	- -	- -	t	250	- -	- -
	Sulfate	mg/L	0.066	0.3	(250)	- -	- -	- -	- -	250	- -	- -
	Fluoride		0.017	0.1								
EPA 353.2	Nitrate/Nitrite as N	mg/L	0.01	0.05	10 [10/1]	- -	- -	- -	10 [10/1] [m]	- -	- -	- -
SM 2450C	Total Dissolved Solids	mg/L	NA	10	(500)	- -	- -	- -	- -	500	- -	- -
SM 2540D	Total Suspended Solids	mg/L	NA	5	- -	- -	- -	- -	- -	- -	- -	- -

Notes:

[1] The project- or event-specific target parameter list will be established prior to the sampling event; samples may or may not be analyzed for all listed parameters.

[2] QLs and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal. MDCs (Minimum Detectable Concentrations) are provided for gross alpha and gross beta instead of MDLs.

[3] State of Idaho Ground Water Quality Rule (IDAPA 58.01.11); secondary standard in parentheses. Compare standard to concentrations in unfiltered samples.

TABLE 2-8

Laboratory Analysis Methods and Achievable Laboratory Limits, Regulatory Standards, and Screening Values
Surface Water and Groundwater Parameters

Analysis Method	Monitoring Parameter [1]	Units	Achievable Laboratory Limits [2]		State of Idaho Standards				Federal Drinking Water MCL [6]		National Recommended Water Quality Criteria -Aquatic Life [7, p]	
					Ground Water [3]	Surface Water [4]	Aquatic Life [5]					
			MDL	QL			Acute	Chronic	Primary	Secondary [s]	Acute	Chronic

[4] State of Idaho Surface Water Quality for Domestic Water Supply Use (IDAPA 58.01.02). Compare standard to concentrations in filtered samples, except as noted.

[5] State of Idaho Surface Water Quality for Aquatic Life (IDAPA 58.01.02); Acute Criteria (CMC) and Chronic Criteria (CCC).

[6] USEPA primary and secondary Maximum Contaminant Level (MCL), National Primary Drinking Water Regulations, EPA (http://www.epa.gov/safewater/contaminants/index.html); 9/11/2009.

[7] Freshwater standards from U.S. Environmental Protection Agency (USEPA). 2009. National Recommended Water Quality Criteria (NRWQC) for Priority Pollutants. EPA Office of Water, Office of Science and Technology (4304T). Available at http://www.epa.gov/waterscience/criteria/wqcriteria.html. Updated December 2, 2009; Acute Criteria (CMC) and Chronic Criteria (CCC)

[8] Uranium is not listed as an approved analyte for EPA Analysis Methods 6020A and 6010C. Therefore, the laboratory is to verify that the QC procedures as listed in the mthods have been met to demonstrate the accuracy and precision for those methods for uranium at the concentration of interest.

[a] Criteria for these metals are expressed as a function of the water effect ratio, WER, as defined in Subsection 210.03.c.iii of IDAPA 58.01.02

[c] Aquatic life criteria for these metals are expressed as a function of total hardness (mg/L as calcium carbonate), the pollutant's water effect ratio (WER) as defined in Subsection 210.03.c.iii of IDAPA 58.01.02 and multiplied by an appropriate dissolved conversion factor as defined by an appropriate dissolved conversion in Subsection 210.02. For comparative purposes only, the values displayed in this table are shown as dissolved metal and correspond to a total hardness of one hundred (100) mg/L and a water effect ratio of one (1.0).

[d] The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. Criteria values for other hardness may be calculated from the following: CMC (dissolved)=exp{mA[ln(hardness)]+bA} (CF), or CCC (dissolved) = exp {mC[ln(hardness)]+bC} (CF).

[e] Value is for chromium III.

[g] Selenium values are 0.005 mg/L for riparian habitat use, 0.050 mg/L for domestic animal drinking water use, and 0.201 mg/L for transitory wildlife drinking water.

[h] The CMC = 1/[(f1/CMC1)+(f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 0.1859 mg/L and 0.01282 mg/L, respectively.

[k] This recommended water quality criterion for selenium is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor (0.996- CMC or 0.922-CCC) that was used in the GLI (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A) to convert this to a value that is expressed in terms of dissolved metal.

[m] Values in brackets are the individual MCLs values for nitrate/nitrite. Nitrate+Nitrite RSL is based on the lesser of the Nitrate RSL and the Nitrite RSL.

[p] Metals are stated as dissolved unless otherwise specified.

[t] Calcium, chloride, iodine, magnesium, phosphorus, potassium, and sodium are classified as non-toxic essential minerals and do not have RSL or MCLs. Chloride does have a secondary MCL.

[v] Copper and lead MCLs are action levels

CWA - Clean Water Act

IDAPA Idaho Administrative Protection Agency'

IDEQ - Idaho Department of Environmental Quality

mg/L - milligrams per liter

NA - not applicable to this method

TOC- total organic carbon

WER - water effect ratio

TABLE 2-9

Laboratory Analysis Methods, Achievable Laboratory Limits and Screening Values
Soil and Sediment Parameters

Sample Media	Monitoring Parameter	Analysis Method[1]	Method Detection Limit (MDL)[1] (mg/kg)	Quantitation Limit (QL)[1] (mg/kg)	Suitability Criteria	
					Panels B and C Topsoil Parameters	Panels F and G Topsoil Parameters
Soil and Sediment	Cadmium	EPA 6020A	0.001	0.02	--	--
	Chromium	EPA 6020A	0.065	0.6	--	--
	Copper	EPA 6020A	0.35	1.0	--	--
	Nickel	EPA 6020A	0.31	1.0	--	--
	Selenium	EPA 6020A	0.032	0.3	--	--
	Vanadium	EPA 6020A	0.019	0.5	--	--
	Zinc	EPA 6020A	0.16	1.0	--	--

[1]Specific QLs and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal.

TABLE 2-10

Laboratory Analysis Methods and Achievable Laboratory Limits
Plant and Animal Tissue

Sample Media	Monitoring Parameter	Analytical Method[1]	Method Detection Limit (MDL)[1] (mg/kg, ww)	Quantitation Limit (QL)[1] (mg/kg, ww)
Vegetation and Periphyton	Cadmium	EPA 6020A	0.005	0.02
	Chromium	EPA 6020A	0.08	0.4
	Copper	EPA 6020A	0.03	0.1
	Nickel	EPA 6020A	0.02	0.2
	Selenium	EPA 7742	0.05	0.1
	Vanadium	EPA 6020A	0.02	0.2
	Zinc	EPA 6020A	0.08	0.5
	% Solids	EPA 160.3 or CLP SOW 390 (Gravimetric, Oven Dry or Freeze Dry)	--	--
Fish and Benthic Invertebrates	Selenium	EPA 7742	0.05	0.1
	Cadmium	EPA 6020A	0.005	0.1
	% Solids	EPA 160.3 or CLP SOW 390 (Gravimetric, Oven Dry or Freeze Dry)	--	--

[1] Specific QLs and MDLs are subject to change based on the laboratory capabilities at the time of sample submittal. QL and MDL concentrations refer to analyses of tissue on a wet weight (ww) basis.

TABLE 2-11

EDD Specifications for the Laboratory

Lab EDD Fields	Description
COCSampleID	Field sample identification number
SampleDate	Date sample collected
SampleTime	Time sample collected
PreparationMethod	Preparation method number
AnalyticalMethod	Analytical method number
Matrix	Sampling matrix
TorDAnalysis	Total or dissolved analysis (filtered or unfiltered sample)
Basis	Wet weight or dry weight concentration
Analyte	Parameter label
Result	Measured concentration
Units	Units of measure
DetLimit	Detection limit and lowest level for reporting numerical results
DetLimitType	Detection limit type (e.g., MDL)
ReportingLimit	Lowest level of quantification
LabQualifier	Parameter value qualifier
Dilution	Dilution factor
LabName	Lab name
SDGNumber	Lab Sample Delivery Group (SDG) number
LabSampleID	Lab sample identification number
ReceivedDate	Date sample received by laboratory
AnalysisDate	Data sample analyzed by laboratory
CAS#	Chemical Abstracts Services number
Qqualifier	USEPA CLP Q qualifiers

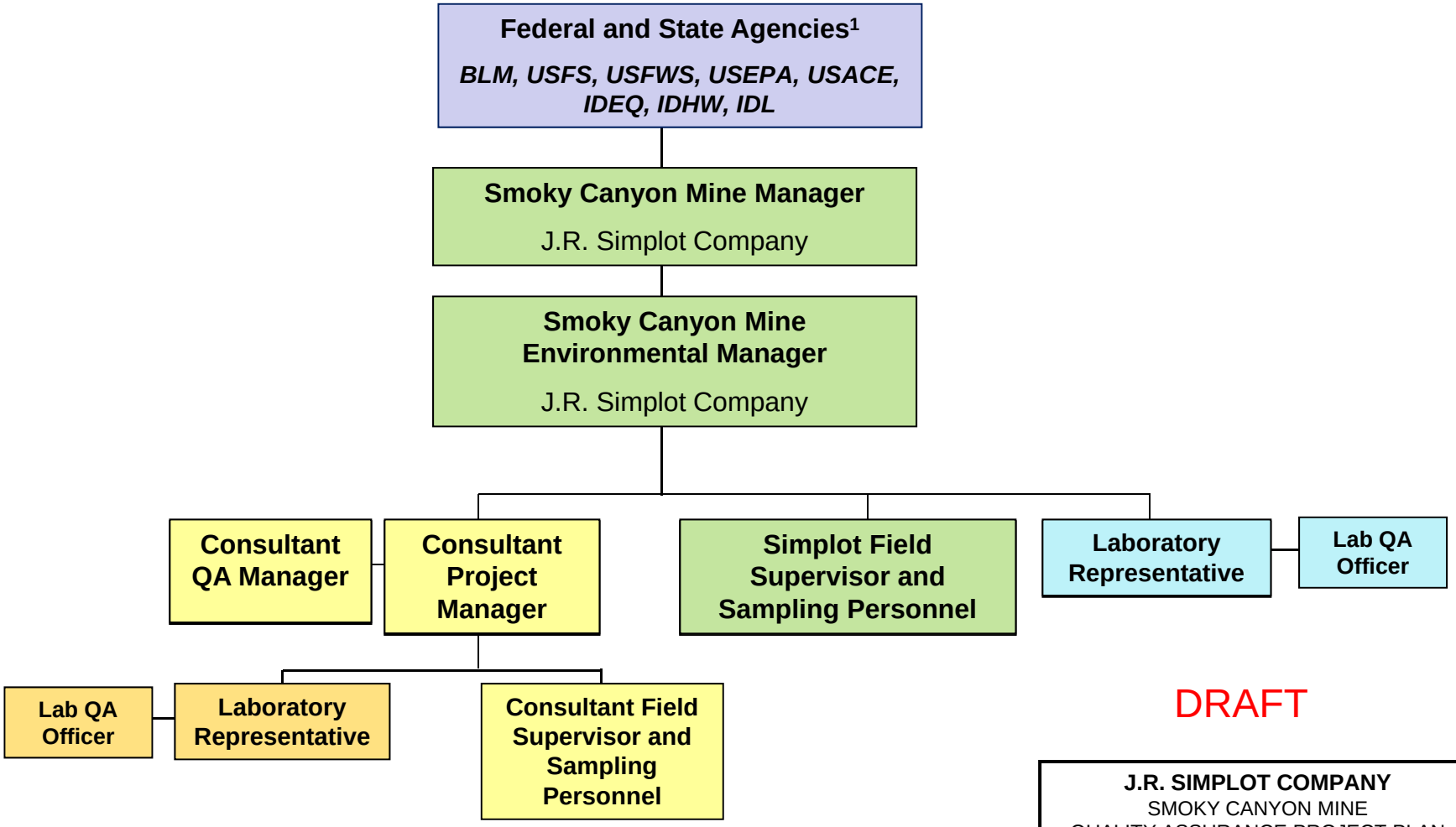
EDD - Electronic data deliverable
MDL - Method detection limit
SDG - Sample delivery group

TABLE 3-1
Field Quality Assurance Sample Types and Frequencies

Sample Media	Quality Assurance Sample Type	Collection Requirement	Specified Frequency
Surface Water	Field Duplicate	All sampling events[1]	1 per 10 samples per event or 1 per event when fewer than 10 samples collected
	Equipment Rinsate Blank	When sampling equipment is reused at multiple locations	1 per 20 samples or 1 per event if less than 20 samples collected
Groundwater	Field Duplicate	All sampling events[1]	1 per 10 samples per event or 1 per event when fewer than 10 samples collected
	Equipment Rinsate Blank	When sampling equipment is reused at multiple locations	1 per 20 samples or 1 per event if less than 20 samples collected
Stormwater	Equipment Rinsate Blank	Before re-use of equipment at a new location	1 rinsate whenever automated sampling equipment is moved for use at a new location
Soil	Field Duplicate	All sampling events	1 per 10 samples or at least 1 per day of sampling
	Equipment Rinsate Blank	When sampling equipment is reused at multiple locations	1 per 20 samples or at least 1 per day of sampling
Sediment	Field Duplicate	All sampling events	1 per 10 samples or at least 1 per day of sampling
	Equipment Rinsate Blank	When sampling equipment is reused at multiple locations	1 per 20 samples or at least 1 per day of sampling
Terrestrial Vegetation	Equipment Rinsate Blank	When sampling equipment is reused at multiple locations	1 per 20 samples or at least 1 per day of sampling
Other Biological Tissue	Equipment Rinsate Blank	When sampling equipment is reused at multiple locations	1 per 20 samples or at least 1 per day of sampling
All sample media	De-ionized (DI) water blank	Once before field equipment blanks are collected using a new source of DI water.	at least 2x per year or as needed based on total number of DI sources

[1] A sampling event may be twice-monthly, monthly, quarterly, and annually or one-time events, as specified by appropriate CEMPP monitoring plan.

QUALITY ASSURANCE PROJECT PLAN - FIGURES



DRAFT

J.R. SIMPLOT COMPANY
SMOKY CANYON MINE
QUALITY ASSURANCE PROJECT PLAN

FIGURE 2-1

PROJECT ORGANIZATION CHART

PRJ: 009-010	DATE: August 2015	
REV: 1	BY: KJT	CHK: FLC

Notes: [1] The agencies listed have authority over different aspects of the mine's environmental monitoring requirements.

QUALITY ASSURANCE PROJECT PLAN - ATTACHMENT 1

JRS SOP No. 20, Rev. 1

J.R. SIMPLOT COMPANY – SMOKY CANYON MINE

STANDARD OPERATING PROCEDURE No. 20

INORGANIC DATA EVALUATION

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes the procedures for the evaluation of data generated through inorganic laboratory analysis of samples collected for environmental assessment at the J.R. Simplot Company (Simplot) Smoky Canyon Mine. These procedures are in accordance with the Quality Assurance Project Plan (QAPP) (Formation, 2015a) used in conjunction with the Comprehensive Environmental Monitoring Program Plan (CEMPP), Draft Revision No. 4 (Formation, 2015b) which comprehensively addresses all existing environmental monitoring requirements associated with mining and reclamation activities at the Smoky Canyon Mine. These procedures apply to three levels of data evaluation: data completeness check, data review and data validation. The data evaluation procedures provided herein are intended to assess data quality of inorganic data with respect to the Smoky Canyon Mine project-specific data quality objectives.

The QAPP, Sampling and Analysis Plan (SAP) and/or any other relevant site-specific or project-specific documents must be reviewed before this SOP is used to evaluate data. The individual performing the data evaluation shall be familiar with the analytical methods and other procedures used for the project. Familiarity with project and laboratory quality control requirements is critical to appropriate use of this procedure. A general description of the different levels of data evaluation is provided below and discussed in detail in Section 4.0 of this SOP.

1.1 Data Completeness Check

Data completeness checks may be performed on both Level 2 standard data reports and Level 4 USEPA Contract Laboratory Program (CLP)-like laboratory reports as specified in the project planning documents and/or by the project team or regulatory agencies.

These completeness checks may be performed as part of a data review or validation or may be performed as a stand-alone evaluation. Completeness checks only document the presence or absence of applicable QC data in the laboratory data package, and no qualification of sample results is necessary based on this data evaluation.

1.2 Data Review

Data review includes a review of laboratory quality assurance (QA) and quality control (QC) sample results provided in Level 2, or equivalent, standard laboratory reports. Data review can also be performed on CLP-like Level 4 data packages if required. In addition to sample results, Level 2 laboratory reports provide QA/QC summaries that typically include results for method blanks, laboratory control samples (LCS), matrix spike (MS) samples, and duplicates, as well as the review of field QC samples (e.g., field blanks and field duplicates). Data review is differentiated from data validation because the review consists of an assessment of the laboratory QA/QC summary reports only.

1.3 Data Validation

Data validation includes the evaluation of the QA/QC results described above as well as an evaluation of additional validation of calculations, calibrations, internal standards, tunes, etc. provided in Level 4 CLP-like data reports. A minimum of 10% of the data reports produced annually by each laboratory analyzing environmental monitoring samples will be reported as CLP-like data reports and validated according to the data validation procedures described in this SOP (Section 4.3). Data validation of the CLP-like data reports will be performed using the general protocols and processes described in this SOP, as applicable to the method calibration and QC limits specified on Tables 2-2 through 2-6 of the QAPP, the Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (NFG; USEPA, 2010) and to the extent possible when certain non-CLP methods are used, laboratory SOPs.

The following table summarizes the common elements and differences between a data completeness check, data review and data validation.

Scope of Data Reviews

Item	Data Completeness Check	Data Review	Data Validation
Review of Work Plan, SAP and/or QAPP	Presence only	X	X
Review of Chain-of-Custody Records	Presence only	X	X
Review of Case Narrative	Presence only	X	X
Verify that preservation and holding time requirements met.	Presence only	X	X
Verify that the required frequency of field QC samples was met.	Presence only	X	X
Verify that ICP/MS tune analyses were performed at the required frequency and that results are within control limits.			X
Verify that all instrument calibration were performed at the required frequency and concentrations and that results are within control limits.			X
Verify that laboratory blanks were performed at the required frequency and that results are within the control limits.	Presence only	X	X
Verify that field blank results are within the control limits.	Presence only	X	X
Verify that all Laboratory Control Sample (LCS) were performed at the required frequency and that results are within control limits.	Presence only	X	X
Verify that matrix spike (MS) sample were performed at the required frequency and that results are within control limits.	Presence only	X	X
Verify that analytical duplicates were performed at the required frequency and that RPDs are within control limits.	Presence only	X	X
Verify that ICP Serial Dilutions were performed at the required frequency and that results are within control limits.			X
Verify that ICP/MS internal standards were included with each sample and that results are within control limits.			X
Verify that field duplicate measurements are within the control limits.	Presence only	X	X
Verify sample calculations.			X
Verify that project completeness goals were met.		X	X

2.0 BASIS FOR METHODOLOGY

The data evaluation procedures described in this SOP are based on the guidance specified in the QAPP and the protocols specified in the USEPA Contract Laboratory Program (CLP) National Functional Guidelines (NFGs) for Inorganic Superfund Data Review (USEPA, 2010). The data evaluation procedure described in this SOP may be used for the evaluation of standard laboratory data reports (Level 2 reports) or CLP-like/Level 4 laboratory data reports. CLP-like/Level 4 data reports are needed in order to complete the validation procedure described in this SOP. It is not meant to replace or incorporate all of the procedures and protocols necessary to complete data validation per the USEPA NFGs. Data qualification may or may not be performed for data review, however data validation will include data qualification.

3.0 DEFINITIONS

Definitions of accuracy, precision, and completeness and methods for computing their measures are provided below. Descriptions of the contents of Level 2 Standard data packages and Level 4 CLP-like data packages are provided in Section 4.2 of this SOP.

a. Accuracy

Accuracy is the degree of difference between the measured or calculated value and the true value. Data accuracy and analytical bias are often evaluated by the analysis of LCS and MS samples, with results expressed as a percentage recovery measured relative to the true (known) concentration.

The percentage recovery for LCS samples is given by:

$$\text{Recovery (\%)} = \frac{A}{T} \times 100$$

where: A = measured concentration of the surrogate or LCS; and
T = known concentration.

The percentage recovery for MS samples is given by:

$$\text{Recovery (\%)} = \frac{A - B}{T} \times 100$$

where: A = measured concentration of the spiked sample;
B = concentration of unspiked sample; and
T = amount of spike added.

Laboratory blanks, and often, field blanks are analyzed to quantify artifacts introduced during sampling, transport, or analysis that may affect the accuracy of the data.

b. Precision

Precision is the level of agreement between duplicate measurements of the same characteristic. Laboratory precision, or analytical error, is assessed by determining the agreement of results for replicate measurements of the same sample. Field precision is assessed by determining the agreement for results for two independent samples collected from the same site at the same time. Precision may be evaluated using LCS/LCSD samples, MS/MSD samples, analytical duplicate samples and/or field duplicate samples. The comparison is made by calculating the relative percent difference (RPD) as given by:

$$\text{RPD (\%)} = \left| \frac{2 (S1 - S2)}{S1 + S2} \right| \times 100$$

where: S1 = measured sample concentration; and
S2 = measured duplicate concentration.

c. Completeness

Completeness is the percentage of usable data measurements obtained, as a proportion of the number of data measurements planned for the project. Completeness is affected by such factors as sample bottle breakage and acceptance/non-acceptance of analytical results. Percentage completeness (C) is given by:

$$C (\%) = \frac{V}{P} \times 100$$

where: V = number of usable data measurements obtained; and
P = number of data measurements planned.

d. Data Qualifier Flags

As a result of the data review or validation procedures (but not data completeness checks), data qualifier flags may be applied to individual analytical results if qualification for project data usability is appropriate. Definitions of the flags applied for data qualification are as follows:

Flag	Definition
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

An explanation regarding the assignment of qualifiers in accordance with the review procedures is detailed below in Section 4.2.

4.0 PROCEDURES

The data evaluation documentation requirements and procedures for data completeness checks, data review, and data validation are described below in the following sections.

4.1 Data Completeness Check Procedure

Data completeness checks can be performed as a stand-alone evaluation or as part of a full data review or validation. A data completeness check is performed to verify that the laboratory data provided are complete. The following shall be reviewed for Level 2 Standard data reports and Level 4 CLP-like data reports.

Level 2 Standard data reports shall include the following information for each sample:

- Field and laboratory sample identification;
- Sample result, method detection limit, and reporting limit, with appropriate units;
- Dilution factor
- Sample collection, receipt, and analysis dates;
- Analytical method(s) references; and
- Laboratory qualifiers and definitions.

In addition, Level 2 Standard data reports shall include the following information in a QA/QC summary:

- Method blank results for each analyte;
- LCS results and laboratory control limits for each analyte;
- MS results and laboratory control limits for each analyte, if applicable;
- Analytical duplicate results and laboratory control limits for each target analyte (LCSD and/or MSD results may be provided instead of analytical duplicate results); and
- Confirmation of instrument calibration; and
- Copies of the signed COCs.

Level 4 CLP-like laboratory reports shall include the following information for each sample, at a minimum:

- Field and laboratory sample identification;
- Sample result, method detection limit, and reporting limit, with appropriate units;
- Sample collection and receipt dates;
- Sample preparation and analysis date/time;
- Dilution factor;
- Preparation and analysis batch numbers or identification;

- Sample matrix;
- Analytical method(s) references;
- Percent moisture determination; and
- For solid-matrix samples, identify basis of reporting (i.e., wet-weight or dry-weight basis).

The following additional information will also be provided in Level 4 CLP-like data reports, as applicable for the reported analytical methods:

- Case narrative;
- Copies of the signed COCs;
- Laboratory method/preparation blank;
- Initial calibration verification (ICV), and continuing calibration verification (CCV);
- Initial calibration blanks (ICB), and continuing calibration blank (CCB);
- Interference check sample, if applicable;
- Matrix spike (MS), and when applicable matrix spike duplicate (MSD), sample recovery and, when applicable, MS/MSD relative percent difference (RPD);
- Post-digest spike sample recovery;
- Laboratory duplicate;
- Laboratory control sample (LCS) recovery;
- ICP and ICPMS serial dilution percent differences;
- MDLs;
- ICP inter-element correction factors;
- ICP and ICPMS linear ranges;
- Preparation log;
- Analysis run log;
- Instrument raw data for verification;
- ICPMS tunes;
- ICPMS internal standards relative intensity summary;
- Sample log-in sheet; and
- Deliverables inventory sheet.

4.2 Data Review Procedure

The data review procedure for review of a Level 2 Standard data report is as follows. Data may or may not be qualified during data review depending on the project specifications.

A. Review copies of the Chain-of-Custody records (COCs). Verify that all necessary information was provided on each COC and that all necessary signatures are present. Review laboratory records of sample temperature upon receipt and preservation information, if available, to verify that samples were properly preserved. Professional judgment may be used to determine if data qualification is necessary due to temperature exceedances and/or preservation deviations. Verify that all samples listed on the COCs were analyzed for the appropriate parameters. Note any problems documented on the COCs by either the laboratory or the sampler.

B. Briefly review and summarize the laboratory case narrative, if present. Note any data that are indicated as outside of control limits.

C. For each sample and each parameter, verify that the analyses were performed within the recommended holding time. For sample analyses performed outside the recommended holding times, sample results may be qualified as described in the QAPP or USEPA NFGs (2010), though professional judgment and project-specified requirements should be used.

D. Identify any field QC samples and verify that the field QC samples specified in the Work Plan, QAPP or other relevant project documents have been collected at the correct frequency.

E. Review the results of all field/equipment blanks and the laboratory method blanks. If an analyte was detected in a blank, the corresponding sample concentrations will be compared to the blank concentrations. Sample results may be qualified as described in the QAPP or USEPA NFGs (2010), though

professional judgment should be used to carefully evaluate the effect of blank concentrations on the sample data.

F. Check the matrices, units, detection limits and reporting limits to verify that they are reported correctly and meet the project-specific requirements, if provided.

G. Review all LCS (and LCSD, if available) recoveries and verify that they were within the project-specified control limits. If project-specific control limits are not provided, use the laboratory's control limits. LCS materials may not be available for all matrices. Sample results may be qualified as described in the QAPP or USEPA NFGs (2010), though professional judgment and project-specified requirements should be used.

H. Review all MS (and MSD, if available) recoveries and verify that they were within the project-specified control limits. If project-specific control limits are not provided, use the laboratory's control limits. If analyzed and reported, post-digestion spike information should also be reviewed. Sample results may be qualified as described in the QAPP or USEPA NFGs (2010), though professional judgment and project-specified requirements should be used. For MS results that do not meet the control limits, the reviewer may choose to apply qualifiers to all samples of the same matrix associated with the MS, if the reviewer considers the samples sufficiently similar.

If an analytical duplicate was analyzed, compare the laboratory calculated RPD and compare this to the project-specified control limits. If a project-specific control limit is not available, use the laboratory's control limits. However, if one or both of the results are less than five times the PQL, use $\pm$ PQL as the control limit for aqueous samples and 2x $\pm$ PQL as the control limit for non-aqueous (i.e., soil, sediment, tissue) sample matrices unless project-specific control limits are provided. If the analytical duplicate results fall outside of the control limits, sample results may be qualified as described in the QAPP or USEPA NFGs (2010), though professional judgment and

project-specified requirements should be used, LCS/LCSDs and/or MS/MSDs may be analyzed in place of, or in addition to, an analytical duplicate. The RPDs for LCS/LCSD and MS/MSD pairs shall be evaluated in the same manner as described above for analytical duplicates.

I. If field duplicates were analyzed, calculate the RPD for each parameter and compare the RPDs to project-specified control limits. If project-specific control limits are not available, use 30 percent for aqueous samples and 50 percent for soil/solid/vegetation tissue samples. However, if one or both of the results are less than five times the PQL, use ± PQL as the control limit for aqueous samples and 2x ± PQL as the control limit for non-aqueous (i.e., soil, sediment, tissue) sample matrices unless project-specific control limits are provided. If the field duplicate results fall outside of the control limits, the associated field duplicate results should be qualified in the same manner described above for analytical duplicates as described in the QAPP or USEPA NFGs (2010), though professional judgment and project-specified requirements should be used. Professional judgment will be used to determine whether additional sample results, in addition to the field duplicate sample results, should also be qualified.

J. Determine whether the project's analytical completeness goal was met. Note any rejected data.

The data reviewer may also provide a brief summary of the accuracy, precision and completeness of the data set. The qualifier flags assigned to the data will be summarized in a table and/or entered into the electronic data deliverable, as specified in the project's QAPP or SAP.

4.3 Data Validation Procedure

A minimum of 10% of the data reports produced annually by each laboratory analyzing environmental monitoring samples from Smoky Canyon Mine will be reported as CLP-like data reports and validated according to the data validation procedures described in this SOP. The data validation procedure shall include all of the above steps in the data

review procedure with additional steps as outlined below. These additional steps include the recalculation of instrument and sample results from the laboratory instrument responses for a subset of the data. These recalculated results are compared to the laboratory reported results to confirm that the instrument outputs were correctly reported. Also, additional QC summary reports will be reviewed including the ICP/MS tune summary, the instrument calibrations, the interference check sample summary, the serial dilution sample summary, and the internal standard relative intensity summary. Data will be qualified during the data validation procedure with the appropriate qualifiers as specified in the QAPP and consistent with USEPA's NFG (2010). A more complete description of the additional steps to be followed in data validation is presented below.

A. Verify sample calculations for a few of each sample results and identify and document any calculation errors if any are present. The raw instrument output will be reviewed to confirm that the analyte concentrations were reported correctly.
B. Verify that the ICP/MS tune analysis data requirements were met and results were within QC limits. Review the raw data for a subset of the tune results and confirm that the raw data matches the results summarized on the ICP-MS Tune summary form. If the ICP/MS tune analysis results fall outside of the control limits, the associated sample results should be qualified as described in the QAPP or USEPA NFGs (2010).
C. Verify that the instrument calibration was performed at the required frequency, that results are within QC limits, and review associated standards, including initial and continuing calibration standards and blanks. For a subset of the analytes, recalculate the percent recoveries for calibration standards using the data on the Initial and continuing calibration verification summary form and verify that the concentrations reported on this form are consistent with those in the instrument output. For ICVs/CCVs that have percent recoveries outside of control limits and for calibration blanks for which analytes are detected, review the run logs to confirm which samples were affected by out of control CCVs and CCBs. Associated sample results should be qualified as described in the QAPP or USEPA NFGs (2010) though professional judgment and project-specified requirements should be used.

D. Verify that Interference Check Sample data requirements were met and results are within QC limits. Recalculate a subset of the percent recoveries and review the raw data to verify that the results from the instrument output match those reported on the Interference Check Sample summary form. If the interference check sample results fall outside of the control limits, the associated sample results should be qualified as described in the QAPP or USEPA NFGs (2010).

E. Verify that ICP serial dilutions requirements were met and results are within QC limits. Recalculate percent differences for a subset of the results and verify that instrument outputs match values reported in the summary form. Where percent differences exceed the control limit and sample results are greater than 50 times the method detection limit, the associated sample results should be qualified as described in the QAPP or USEPA NFGs (2010).

F. Verify that ICP/MS internal standard requirements were met and results within QC limits. Review raw data and recalculate a subset of the relative intensities of the internal standards and compare them to those reported on the internal standard relative intensity summary form. The associated sample results should be qualified as described in the QAPP or USEPA NFGs (2010).

Qualify all sample data associated with QC or calibration that do not meet the project specifications or QC limit using the appropriate qualifiers as defined in Section 3.4 Data Qualifiers. Use the guidance for data qualification from the project specific guidelines in the QAPP or guidance in the USEPA NFG (2010).

5.0 DOCUMENTATION

The data evaluation procedures and results will be documented through completion of a checklist, worksheet or summary document, subject to review and approval by the appropriate project representative(s). The data evaluation documents will be provided to the Project Manager and included in the project file containing the associated laboratory result reports.

Include the project name, project number, laboratory name, laboratory project number, field sample IDs, sample matrix, and analytical parameters and methods used on the data evaluation documentation forms. Specify the relevant project-planning documents and reference the protocol that was used to perform the data evaluation (such as this SOP).

A data review checklist is provided in Attachment A and a data validation checklist is provided in Attachment B. The table in Section 1.3 or list of report contents in Section 4.1 can be used as the basis for a checklist of the data completeness check.

6.0 DATA USE

Qualifier flags are assigned to describe the degree to which individual values provide accurate and precise results. The general criteria for assigning flags and their meaning in terms of future data use are as follows:

- Values assigned J flags (J, J+, or J-) are considered estimated results. QC data supplied with those values indicate that they may not be accurate or precise within the limits specified in the QAPP or a project-specific document, but that the magnitude of the potential imprecision or inaccuracy is not great enough to reject the value for project data uses.
- Values assigned R flags do not meet the requirements for accuracy, precision, representativeness, or reproducibility specified to provide quantitative data for the project data uses. The R flag indicates that serious deficiencies were encountered preventing the generation of usable data for the project objectives.
- Values assigned U flags indicate that a concentration of the analyte cannot be confirmed due to the presence of an interferant or the presence of the analyte in associated blanks. UJ flags may be applied to indicate that the presence of the analyte cannot be confirmed and the value of the reported quantitation limit for the sample may not be accurate or precise. Values flagged with U or UJ are fully usable and should be considered undetected.
- Values without flags assigned have met all of the project data quality objectives and are suitable for all project data uses.

7.0 QUALITY ASSURANCE/QUALITY CONTROL

The data evaluation documents will be reviewed internally for conformance to the procedures described herein. Once any questions or comments resulting from that

review have been resolved, the data evaluation documents will be considered final and any data qualifiers will be assigned to the results that are ultimately included in the project's electronic database.

8.0 REFERENCES

Formation Environmental, 2015a. Draft Revision No. 1 Smoky Canyon Mine, Quality Assurance Project Plan for Environmental Monitoring Activities, prepared for J.R. Simplot Company. February.

Formation Environmental, 2015b. Draft Revision No. 4 Comprehensive Environmental Monitoring Program Plan (CEMPP), Smoky Canyon Mine Site, and associated Quality Assurance Project Plan, prepared for J.R. Simplot Company. March.

U.S. Environmental Protection Agency (USEPA), 2010. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. EPA 540-R-10-011. January.

ATTACHMENT A

JRS DATA REVIEW CHECKLIST

JRS
DATA REVIEW CHECKLIST

Project Name:
Project No.:
Laboratory Name:
Laboratory Project No.:
Field Samples:
Matrices:
Parameter(s)/Analytical Method(s):

	Yes	No	NA
1. Is a Work Plan, SAP or QAPP available?			
2. Chain-of-Custody (COC) Records:			
Are the COCs present?			
Are the COCs complete and signed off?			
Were the samples received at $4^{o} \pm 2^{o}C$?			
Were all samples on the COCs analyzed?			
Were any problems noted?			
3. Were any problems noted by the laboratory in the narrative?			
4. Were all preservation and holding time requirements met?			
5. Was the frequency of field QC sample collection met?			
6. Were all lab blank results non-detect?			
7. Were all field blanks non-detect?			
8. Were all LCS requirements met?			
9. Were all MS sample requirements met?			
10. Were all analytical duplicate RPDs within control limits?			
11. Were all field duplicate RPDs within control limits?			
12. Was the project completeness goal met?			

COMMENTS:

Reviewed by: **Date:**

ATTACHMENT B

JRS DATA VALIDATION CHECKLIST

JRS
DATA VALIDATION CHECKLIST

Project Name:
Project No.:
Laboratory Name:
Laboratory Project No.:
Field Samples:
Matrices:
Parameter(s)/Analytical Method(s):

	Yes	No	NA
1. Is a Work Plan, SAP or QAPP available?			
2. Chain-of-Custody (COC) Records:			
Are the COCs present?			
Are the COCs complete and signed off?			
Were the samples received at $4^{o} \pm 2^{o}C$?			
Were all samples on the COCs analyzed?			
Were any problems noted?			
3. Were any problems noted by the laboratory in the narrative?			
4. Were all preservation and holding time requirements met?			
5. Was the frequency of field QC sample collection met?			
6. Was the ICP/MS tune analysis performed within limits?			
7. Were all instrument calibration requirements met?			
8. Were all lab blank results non-detect?			
9. Were all field blanks non-detect?			
10. Were Interference Check Sample (ICS) requirments met?			
11. Were all Laboratory Control Sample (LCS) requirements met?			
12. Were all matrix spike (MS) sample requirements met?			
13. Were all analytical duplicate RPDs within control limits?			
14. Were ICP Serial Dilution requirements met?			

JRS
DATA VALIDATION CHECKLIST

15. Were ICP/MS Internal Standard requirements met?

16. Were all field duplicate RPDs within project control limits?

17. Was the project completeness goal met?

COMMENTS:

Reviewed by: **Date:**